

Railway Age Gazette

Including the Railroad Gazette and the Railway Age

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GENERAL NEWS SECTION.....

IN an editorial on co-operation between railways and their employees in our issue of May 10 ("The Railway Labor Situation," page 1032) brief descriptions were given of plans adopted by the Baldwin Locomotive Works and the Union Switch & Signal Company for enlisting the interest of employees in the welfare of the companies by enabling them to become stockholders. A plan for assisting employees to buy stock has been in effect on the Illinois Central since 1893, when it was announced in a circular issued by President Stuyvesant Fish. All officers and employees are given the privilege of subscribing for one share at a time for which they pay in instalments of \$5 or multiples of that sum to be deducted from their monthly wages. The price paid is the market price at the time of application. When the payments are completed a stock certificate is delivered and registered on the company's books. The employee can then, if he wishes, begin the purchase of another share. While instalments are being paid they are credited with interest at 4 per cent., unless twelve consecutive months elapse without payment, in which case the interest ceases to accrue at the expiration of that period and the sum to the employee's credit is returned to him on application. If an officer or employee making payments desires for any reason to discontinue them he can have his money returned with accrued interest at 4 per cent., by making application to the head of his department. The company, therefore, acts as a savings bank for employees, even though they finally decide not to take the stock subscribed for. If an employee leaves the service he must either pay in full for the share for which he has subscribed and take his certificate, or take back his money with the accrued interest. Employees may also subscribe for one or more shares for cash, providing they have not already an outstanding application for a share on the instalment plan which is not fully paid for. While the number of employees who have taken advantage of the plan is small in proportion to the total number, many have availed themselves of the privilege of thus identifying their interests with those of the company.

UNFAIR usage or rough handling is responsible for the damage to from 55 to 60 per cent. of the freight cars which require repairs. This is not a guess, or an estimate, but the result of careful and accurate observations extending over 30 to 60 day periods; moreover it checks closely on two roads located in different sections of the country. The equipment of one road is largely of wooden construction, while that of the other contains a large proportion of all-steel cars. It is important to note also that these percentages do not cover the actual cost of repairs, but the number of cars damaged. The percentage for the cost of repairs would be higher, because cars damaged by unfair usage are usually more expensive to repair than those which are damaged because of defective material or poor construction. The conservativeness of these figures will be apparent when it is known that only those cars were credited to unfair usage on which the breaks or damage indicated a good grade of material and proper construction. Where poor construction or defective material was apparent, the treatment of the car was not held responsible for the damage, even though its extent was such as to indicate unfair usage. Is it impossible for the operating department to control this abuse? That department does not fail to criticize the mechanical department when repairs are not promptly made; does it realize how much it could do itself to keep the cars from getting on the repair tracks? If the damage to freight cars because of unfair usage could be cut in two, think of the effect it would have on the balance sheet at the end of the year and of the great amount of wasted time and energy it would save because of overcoming the failure to provide cars during periods of congestion! It is true that labor conditions are to a great extent responsible for this condition. Yet those who control the trainmen's unions can be brought to a realization of the actual magnitude of the losses which are being incurred the country over by carelessness and thoughtlessness on the part of the

trainmen, and, within limits, they can be brought to act on this realization, so as to bring about a better spirit of co-operation between the men and their employers. It may be a long uphill job to do this, but since it would be worth so much to the men, the railways and the public at large, why not make the effort?

IN our issue of March 8, page 432, was published an article by Frank V. Whiting, general claims attorney of the New York Central Lines, on a study of the reports of accidents resulting in the deaths of 1,000 trespassers on railways. The article showed that the great majority of these trespassers are not tramps, as might be supposed, but regularly employed working men, business men, and women and children. R. C. Richards, general claim agent and chairman of the Central Safety Committee of the Chicago & North Western, has made a similar compilation regarding the trespassers killed and injured on this road in the year 1911, which corroborates Mr. Whiting's conclusions. Of the 141 persons classed as trespassers who were killed, but 32 were reported as of unknown occupation, 15 as having no regular occupation, and 13 as having no occupation, including the aged and infirm. This leaves 81 who were classified as to occupation, and includes 24 laborers, 17 farmers and farm hands, 9 shopmen and mechanics, 4 woodsmen and loggers, 3 each of railway employees, carpenters and cabinet makers, school children and students, 2 each of sailors and boatmen, miners, merchants and salesmen, and 1 bricklayer, 1 hotel man, 1 janitor, 1 village president, 1 soldier, 1 telegraph lineman, 1 livery helper, 1 domestic, 1 teacher, 1 cigar maker, 1 asylum inmate and 1 infant under 6 years old. Fourteen of those killed were minors between the ages of 14 and 21 years and 3 under 14 years. Of the 151 persons injured while trespassing 18 had no regular occupation and 8 were reported as of unknown occupation, while there were 31 laborers, 16 school children and students, 15 shopmen and mechanics, 10 farmers and farm hands, 7 housewives, 4 woodsmen and loggers, 4 miners, 3 each of bricklayers and masons, carpenters and cabinet makers, clerks, teamsters, and infants under 6 years; 2 each of railway employees, circus laborers and hotel and saloon men; a sailor, a merchant, a teacher, a cigar maker, a musician, a plumber, a housekeeper, a gardener, a ditcher, a florist, a cook, a blacksmith, a physician, a minister, a lawyer and a weighmaster. The list of injured includes 16 minors under 14 years of age and 16 between the ages of 14 and 21. One-half of the persons killed by the railways are persons such as those named who have no business on railway property and whom it is the duty of state and municipal authorities to keep from using the tracks as a highway or stealing rides on trains. Compilations such as those made by Mr. Whiting and Mr. Richards, showing that the trespassers killed and injured are the same kind of people as the average passenger or employee killed or injured, should have some effect in impressing the authorities with a sense of their responsibility.

DURING the first four months of the present calendar year, from January 1 to May 1, the *Railway Age Gazette* has reported orders for 62,464 freight cars, 1,067 passenger cars and 1,476 locomotives. For the entire calendar year 1911 the orders as reported in our statistical number of December 29 amounted to 133,117 freight cars, 2,623 passenger cars and 2,850 locomotives. In the case of freight cars and locomotives, therefore, the orders placed in the first one-third of 1912 amount to about one-half of those for the entire year 1911; and in the case of passenger cars the number is larger in proportion than for last year. Totals compiled from our weekly reports of equipment orders are, of course, subject to omissions, especially of many of the smaller orders, and are necessarily less complete than our annual statistics. When it is considered that a very large proportion of last year's equipment orders was placed during the last three months of the year, it would ap-

pear that the equipment market has at last started on a strong upward trend. Based on the showing for the first four months the total of freight car orders for this year should be 187,000. The annual average for the past five years has been only 35,000. It is true that owing to keen competition among the manufacturers most of the cars ordered this year have been booked at low prices. But they have not been as low as the figures prevailing a year and a half to two years ago when builders were eager to secure orders at cost in order to maintain their organization; and as the amount of business has approached the capacity of the plants prices have naturally hardened. The recent increases in the number and magnitude of equipment orders are ascribed to the fact that the railways have been obliged to refrain from buying for so long that the demand for new cars and locomotives has become imperative rather than to any increase in prosperity on the part of the roads; but when it is considered how far below normal requirements the orders have been for two years past it seems only reasonable to assume that the present tendency will continue for some time to come. The figures for freight car orders since January 1 have been greatly increased by some large orders that have been placed by western lines during May, including those of the Harriman Lines for 9,100, the Frisco for 6,000, the Santa Fe for 5,100 and the Canadian Pacific for 4,000 in this country in addition to those that will be built in this company's shops. There are also many inquiries in the market for large numbers of cars which have not yet been ordered. The Harriman Lines, Canadian Pacific, St. Paul, Pennsylvania and Santa Fe have been large purchasers of locomotives, and the Pennsylvania, New York Central, Harriman Lines and Illinois Central have placed some large orders for passengers cars.

THE LEGAL STATUS OF JOINT TERMINALS.

THE decision of the United States Supreme Court in the suit of the government under the Sherman law against the Terminal Railroad Association of St. Louis was briefly abstracted in the *Railway Age Gazette* of April 26, page 975. The decision holds that the Terminal company as now organized is a monopoly in violation of the law. In reality, however, the result is a victory for the Terminal company, or at least for the policy of unifying terminals, as has been done at St. Louis.

The Terminal Railroad Association owns much the greater part of the facilities for handling traffic into, out of and through St. Louis. It, in turn, is controlled by 15 trunk lines. It was organized in 1889 to take over the Eads Bridge, the old Union Depot Company, the Union Railway Terminal Company and the St. Louis Terminal Railroad, all previously controlled by the Wabash and Missouri Pacific, and to build the Union passenger terminal opened in 1894. It later acquired control of the Merchants Bridge Company, the Wiggins Ferry Company and the St. Louis Transfer railway. The government sought the dissolution of the combined property into its constituent parts. It claimed competition had been destroyed, and that only thus could it be restored.

The Supreme Court of Missouri already had refused in a proceeding brought by the state under the state anti-trust law to dissolve the combination of the properties of the Merchants Bridge Company and the Terminal Railroad Association. It held that "the merger of mere railway terminals used to facilitate the public convenience by the transfer of cars from one line of railway to another, and instrumentalities for the distribution or gathering of traffic, freight or passenger, of many scattered industries or to different business centers of a great city, were not properly railway companies within the reasonable meaning of the statutes forbidding combinations between competing or parallel lines," and had graphically described the economic waste and the expense and inconvenience to shippers and railways which would be caused if each road were required to maintain separate terminals. The result to the shipper would be to compel him "to employ the railway with which

he has switch connection or else cart his product to a distant part of the city at a cost possibly as great as the railway tariff." The effect on the railways would be to compel them to multiply passenger stations, freight depots and switch yards, and "then not only would the expense of obtaining the necessary rights of way be so enormous as to amount to the exclusion of all but a few of the strongest roads, but if it could be accomplished the city would be cut to pieces with the many lines of railways intersecting it in every direction, and thus the greatest agency of commerce would become the greatest burden." (182 Mo., 284-289.) The United States Supreme Court recognized the advantages to both the railways and the public of unified terminals, and quoted from this decision of the Missouri Supreme Court with approval.

It found, however, that in some respects the Terminal Railroad Association is not so organized and managed as to escape condemnation as a restraint on commerce. Certain of the features of its management of which the court disapproved were changed before the decision was rendered. For example, it is no longer true, as it was when the testimony in the case was taken, that shipments for St. Louis are billed to East St. Louis. Through rates between St. Louis and eastern points are now made and published and the traffic is billed accordingly. The court condemned the practice of charging an "arbitrary" for transportation across the Mississippi river to points on the lines of the Terminal company of traffic originating within a radius of 100 miles, while a similar arbitrary was not imposed on traffic originating outside the 100-mile zone. If by this it is meant that all the charges for hauling across the river traffic originating within the 100-mile zone must be absorbed so long as the similar charges on traffic originating outside of that zone are absorbed, it follows that there must be a material readjustment of rates into and out of both St. Louis and East St. Louis. It is contended by some that the court meant the same rates must be made from all points to both St. Louis and East St. Louis; but the language of the decision is not open to any such interpretation. The Supreme Court orders that the decree shall not "affect in any wise the power of the Interstate Commerce Commission over the rates to be charged by the terminal company"; and obviously the question of what readjustment shall be made in the rates is one that can best be settled by the commission.

One requirement that the court makes, if the Terminal Railroad Association is to be brought within the law, is the insertion of a provision in the contract between it and the proprietary companies for the admission of any existing or future railway that may desire to come into joint ownership and control of the Terminal properties on terms that shall put it on equality with existing proprietary companies. Since the organization of the Terminal the number of proprietary lines has increased from six to fifteen, which shows there has been no disposition to exclude additional railways from both the burdens and the benefits of proprietorship. Another requirement made is that the plan of reorganization shall provide for the use of the terminal facilities on reasonable terms by any railway not electing to become a joint owner. Nor will this necessitate any radical change in the policy of the Terminal, for railways having no proprietary interest are now using its facilities under contract. A third requirement is the abrogation of the present agreement between the Terminal company and the proprietary companies restricting any of them to the use of the facilities of the Terminal. This will present no serious problem, for some companies are already using other facilities as well as those of the Terminal, and, because of the difficulties of acquiring the necessary property, there is little danger of any very serious competition with the Terminal developing.

The great point established is that the merger of Terminal facilities in large cities, which clearly is economically desirable, is also entirely legal when adequate provision is made for the use of the facilities on reasonable terms by all roads entering

or desiring to enter. In many ways the organization and management of the Terminal Railroad Association of St. Louis offer a model which might profitably be followed in other large centers of traffic, and the reorganization which the Supreme Court orders is not calculated to impair its efficiency, although the readjustment of rates required may have an unfortunate effect on railway earnings unless the fact is recognized that a discrimination may often be more equitably corrected by raising some rates, or by raising some and reducing others, than by merely making reductions.

THE COMMERCE COURT QUESTION.

THE *Chicago Tribune*, in its issue of May 11, published an editorial headed "Precipitate Action," which is the ablest and fairest discussion of the Commerce Court question that we have seen. It is in full as follows:

"The action of the house in voting to abolish the newly founded Commerce Court should be very carefully considered in the senate.

"The Commerce Court was created for very excellent reasons to meet a very plain need. To abolish it before it has had any real chance to demonstrate its usefulness through a reasonable period of years, and especially to abolish it because its first few decisions are not approved, is a crude form of recall not only of decisions and of judges but of an institution which yet may prove itself of great value.

"The charges against one of the members of the court, Judge Archibald, involving him in relations with a railway should in no manner affect the existence of the court itself. Should we abolish the Supreme Court if one of its members proved venal?

"As to the arraignment of the Commerce Court by the commerce commission, it offers no sound reason for the destruction of its reviewing tribunal.

"The Commerce Court is criticised because it reversed the commission in twenty cases out of twenty-seven appealed. This fact is by no means conclusive of bias. It is fair to assume that the railways appeal their strongest cases. It is also fair as well as wise to wait for a longer period before checking up on advantages. A court worth its salt, a really unbiased court, does not decide by the methods of compromise, giving each side an equal number of decisions. It is sworn to decide according to the law and the evidence. If the Commerce Court is wrong upon the law and the evidence an appeal to the Supreme Court is pretty certain to correct that error.

"If the Commerce Court has usurped powers there is remedy by appeal to the Supreme Court, or, if that fails, by amendatory legislation.

"In short, none of the objections raised goes to the institution itself, and there remain unchallenged the sound reasons for its creation—namely: to avoid the diversity of ruling necessarily the result of appeals to the regular circuit courts of appeal and to provide a single special court which in due time would become expert in passing upon interstate commerce problems. The commission can hardly be ready to assume that its decisions should be held superior to review.

"It may seem to be good politics for the house to wipe out the Commerce Court, but the senate should not assent unless the case against the court can be shown to rest on much broader and deeper foundations than a remonstrance against a probably temporary and accidental preponderance of decisions favorable to the railways. If the Commerce Court is to be abolished because a greater part of its decisions in the brief term of its existence have favored the railways, the Interstate Commerce Commission's total record with much more justice may be checked up to discover whether its decisions tend greatly in the opposite direction."

As the *Tribune's* editorial indicates, the whole campaign against the Commerce Court has been most unfair. It has been about the most disreputable episode in the history of railway regulation in the United States. It was begun before the court had ever rendered a decision, and it is now being pushed along by every demagogue and peanut politician in the country. It is popular to attack both the railways and the courts; and no demagogue or vender of political peanuts would miss the chance that the existing situation offers to attack them jointly by assailing the Commerce Court. The character of the entire campaign is illustrated by the attempt to slip through the provision abolishing the court as a rider to the appropriation bill.

Suppose the campaign is successful. Will the Interstate Commerce Commission have more authority? On the contrary, every appeal now taken from it to the Commerce Court would then be taken to the circuit courts of appeals. Would the circuit courts of appeals be more apt than the Commerce Court to uphold the commission? On the contrary, the records show that before

the Commerce Court was created the circuit courts, the circuit courts of appeals and the Supreme Court of the United States reversed the commission as often in proportion as the Commerce Court has been doing. There is no reason to suppose the circuit courts of appeals would do differently in the future. There is an impression that the Commerce Court has some special authority over the commission which the other federal courts before its creation did not possess. This is wholly erroneous. It has not exercised, and does not possess, any authority over the commission which the circuit courts of the United States did not have before the Commerce Court was created and which the circuit courts of appeals would not have and exercise after the Commerce Court was abolished.

If the Commerce Court were the only one with whose decisions the Interstate Commerce Commission is displeased the situation might be a little different. But the commission complains as loudly of the decisions of the Supreme Court as it does of those of the Commerce Court. In the Willamette Valley Lumber case, the circuit court upheld an order of the commission reducing certain rates. The Supreme Court (*Southern Pacific v. Interstate Commerce Commission*, 219, U. S., 433) reversed both the circuit court and the commission. The commission thereupon in its annual report for 1911 (page 46) said that it was "impossible to say exactly what significance should attach to this decision" of the Supreme Court, and implied that its tendency was "to put the property interests of this country at the mercy of the railways without that restraint which, in our opinion, the Congress by the act to regulate commerce intended to impose." The commission indulged in similar criticism of the decision of the Supreme Court in *Interstate Commerce Commission v. Diffenbaugh et al* (222 U. S., 42) and *Interstate Commerce Commission v. Peavey & Company* (222 U. S., 42). These cases involved the right of railways to pay elevator companies for elevating their own grain; and the Supreme Court held unlawful a decision rendered by the commission. In commenting on the Supreme Court's decision in its annual report for 1911 (page 51) the commission used the following language:

"In other words, the Supreme Court holds that a statute which was enacted for the express purpose of forbidding discrimination in favor of the owner of an elevator has permitted and perpetuated a possible discrimination in that very particular."

The commission has said nothing in reference to the Commerce Court more resentful and disrespectful than this. It has implied not only that it knows the law better than the Commerce Court, but that it also knows the law better than the Supreme Court. Why then, is there no movement to abolish the Supreme Court?

The abolition of the Commerce Court at this time would be a public calamity because it would establish a precedent for the destruction of judicial bodies which insist on deciding cases according to their own view of the law instead of according to somebody else's. Even Mr. Roosevelt opposes the recall of judges; and as to the recall of judicial decisions favors it only in the case of decisions rendered by state courts.

There are methods already provided for dealing with any derailedictions of the Commerce Court. If its judges are corrupt or incompetent they can be impeached. If its decisions are wrong they can be appealed from and reversed. If, after it has been given a fair trial over a considerable period of years, its conduct seems open to condemnation it can be and ought to be abolished. But to abolish it on the ground that its interpretations of the law are incorrect and unfair when, at the time this is written, but a single case that has been appealed from it has been decided by the Supreme Court—and that not a case involving a railway but the statistical reports of water lines—would be an act so obviously political in its character, so unfair and ignoble, as to reflect lasting disgrace on every man who voted for it or was concerned in instigating it. Surely, the Senate, unlike the House, will act with some intelligence and decency regarding this matter.

WHEN THE RAILWAYS REFORM THEMSELVES.

MANY loud complaints of unfair discriminations by railways have been made by shippers, and many laws have been passed, largely at their instance, to reform the roads. Sometimes the railways, tired of being at the sharp end of the reform stick, have taken steps to reform themselves. The attitude of the shippers directly affected often has then undergone a striking transformation.

A case in point is the action of the railways in Central Freight Association territory, reported in our news columns last week, in abolishing allowances to grain elevators for providing grain doors for the side door protection of bulk grain loading. The western roads already, on July 1, 1911, had made an arrangement to have a joint agent recover used doors and do the necessary re-coopering of cars. But when the Chicago lines, through the General Superintendents' and the General Managers' Associations, tried to adopt the same plan in Chicago the elevator interests offered stout opposition.

It had been the custom to allow the elevator company to provide the grain doors and for the railway to pay it for them under a published tariff at the rate of 50 cents per door, but not for more than four doors, or \$2 per car. There are 65 points in Chicago where grain is loaded and unloaded at elevators, and there are handled annually 150,000 cars at a cost of \$300,000 for grain doors. Investigation disclosed that many shippers were regularly charging \$2 per car for furnishing doors, whether they furnished them or not. Grain doors once used were seldom heard of again—at least in a form in which they could be identified! Very commonly they were removed from an inbound car, the stencils were changed and they were put on an outbound car, the railway then being charged \$2 per car for these "new" doors. In a notable decision the Interstate Commerce Commission told the railways that with proper economy they would not need an advance in freight rates. Representatives of the shippers spoke more plainly and declared the elimination of some of the "graft" from the business of the railways would help them attain a happy condition of prosperity. The roads have applied both suggestions to the grain door business amounting, as already stated, to \$300,000 a year in Chicago alone.

The possibility of economy and the need for action were emphasized when the grain shippers in the Chicago district on July 15, 1911, in the face of the cancellation of the grain door allowances in the West, coolly asked to have the allowance per car increased in the Chicago district from \$2 to \$3. On September 6 the request was modified, and it was indicated that they might be induced to accept \$2.50 a car. When an effort was made by the General Managers' Association to secure the co-operation of the Chicago elevator owners in the interest of needed reform, the argument was made that it was not practicable for the railways to furnish the doors themselves, and officers of the Chicago Board of Trade threatened to appeal to the courts to enjoin a cancellation of the grain door tariff as a discrimination unless similar action were taken throughout Central Freight Association territory. There was also heated talk of diverting traffic as a punishment for the railways for not "keeping off the graft." But the compelling influence of tonnage cannot be used against the General Managers' Association as it can against an individual road. Instead of yielding to the shippers, the association asked for an opinion of the Interstate Commerce Commission. Commissioner Lane replied as follows:

"There is no question in my mind but that a carrier may, and, in fact, should, undertake to furnish a fully equipped car for the carriage of grain. The provision of the law under which an allowance is made to the shipper who furnishes part of the service was really intended to give us control over certain charges arising out of railway practices that never should have become railway practices. If grain doors are necessary to the carriage of grain they should be furnished by the carrier, and a shipper has no right whatever to claim that he may provide such doors and receive an allowance therefor when the carrier itself undertakes to furnish such doors. Of

course, if there is a profit coming to the shipper out of such doors and you make the allowance to one shipper and to the others furnish the doors yourselves you are just rebating by the amount of that profit to a certain shipper. I think the view of the commission is that the entire car should be furnished by the carrier in proper shape for movement."

The Central Freight Association roads, accordingly, filed their new tariff, effective May 1. Then a number of Indiana grain shippers, acting, it is thought, at the instigation of the Chicago elevator owners, appealed to the Indiana railway commission to suspend the tariff in Indiana, and a similar request was made of the Interstate Commerce Commission. The Indiana commission did suspend it, but after a hearing and after being advised of Commissioner Lane's opinion, vacated its order on April 29.

The strenuous opposition of the elevator owners to the elimination of a privilege so long enjoyed is easily understood when it is stated that one of the largest grain dealers in Chicago had been collecting \$50,000 a year in grain door allowances, and another owner of elevators declared the new plan would deprive his concern of \$20,000 per annum. Moreover, ex-President Reynolds of the Indiana Grain Dealers' Association stated at the hearing before the Indiana commission that grain door profit had been considered as an "elevator asset."

With the function of providing grain doors in the hands of a joint agent representing the railways, this profit to the shippers, which has been an equal expense to the railways, will be wiped out. Doors from inbound cars will be gathered up and returned to their owners at a charge of 5 cents apiece, and the re-coopering will be done under the jurisdiction of the railways. Moreover, it will be a much simpler matter to check and govern the operations of the agent than those of a number of shippers who control a large amount of traffic.

The kind of profit which has been derived from billing the railways for four doors when but one was furnished is certainly a proper object of economy, and the roads are to be congratulated on having cleaned up a situation, which, in fact, should never have been allowed to exist. Railways have been too long criticized for discriminations that have been forced on them by big shippers, and which almost always mean a loss of revenue to the roads. Organizations such as the General Managers' Association, which are not subject to the kind of pressure which the big shipper can put on individual roads, can be made most effective in removing abuses; and Commissioner Lane has furnished an example of the kind of co-operation the railways need from public authorities. Meanwhile, the next time big shippers set up complaints about unfair discrimination by the railways the public may help itself to get the right point of view by considering how this grain door "graft" in Chicago developed, and the methods used to have it continued in the face of the expressed opinion of a member of the Interstate Commerce Commission that the allowances the shippers were being paid were unlawful rebates.

NEW BOOKS.

Standard Forms of Field Notes for Civil Engineers. By Charles C. Anthony, Instructor in Engineering and Mathematics, Union College. 5 in. x 7 in. 55 pages. Cloth binding. McGraw-Hill Book Company, New York. Price, \$1.00.

The ability to keep clear, concise and uniform field notes should be a requisite of all instrument men, and the simplification and standardization of such notes is an end which, if attained, would add materially to the efficiency of a field party. This little book by Mr. Anthony is intended to provide forms for such standardization. Suggestions as to details of this kind, which every instrument man works out in a certain measure for himself, are apt to be criticized, but the forms presented have many points to recommend them and are worth the consideration of young engineers seeking good practice in note-keeping and older engineers who have possibly deviated from what they know after years of experience to be the best practice. It may be argued that the book does not cover the entire field of surveying, but the forms given are for the classes of maintenance and reconstruction surveys to which is devoted the least time in technical courses and which young engineers are likely to need first.

Letters to the Editor.

NEED OF CHANGES IN DEMURRAGE RULES.

PHILADELPHIA, April 30, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

We have read with a great deal of interest the communication of Theodore Voorhees, vice-president of the Philadelphia & Reading in your issue of the 5th instant, on the subject of demurrage, and note with astonishment the easy swing with which he handles the subject, which has been one of the most difficult with which the railways have had to contend for the past twenty years.

The present rules were formulated by the National Association of Railway Commissioners, with one Interstate Commerce Commissioner working with its committee, and were adopted by the railways throughout the country in 1910, with the understanding that in their present form they were merely tentative, and subject to such changes and modifications as might be deemed advisable after a fair trial. That the rules are not satisfactory to the shipping public is evidenced from the general dissatisfaction expressed throughout the country; and by the fact that meetings between the commercial bodies representing the shippers and consignees of the country with officers of the Interstate Commerce Commission and the American Railway Association, indicate that the railways and the commission are seriously considering the modifications of rules which have been found after about two years' trial, to need changes in the interest of fairness.

Only recently representatives of the railways and shippers, with the aid and support of one of the interstate commerce commissioners, agreed upon certain revisions of the rules, which revisions will be submitted to the commission, making for some increase in fairness to all parties; though this is not such a complete revision as many shippers feel they should have.

Mr. Voorhees says that experience also shows that those working under the average agreement practically eliminate the demurrage charges, as the rules are favorable to the large shippers, excepting only in the case of one who undertakes to handle a volume of traffic greatly in excess of his capacity for storage, when, of necessity, demurrage charges accrue. This would seem to put the burden of demurrage upon the little fellow. This is a frank and startling admission, particularly in view of the fact that for twenty years past, or during the existence of demurrage regulations, the charge has been made by the shipping public that the little fellows were compelled to pay demurrage, while the large concerns were not; and the experience which the Philadelphia & Reading has had in collecting demurrage charges from the little fellow and letting the big ones go free, emphasizes this feature of the article in question.

There are three important rules to which exception is taken, namely, Inclement weather, Bunching, and Railroad Errors and Omissions. It is apparent even to those with little experience in demurrage, that while no delicate diplomacy may be necessary, the facts in any case are not "readily discoverable," and that the results are not "fixed absolutely by the rules themselves." Careful and impartial investigation, with a uniform course of procedure under the rules, is not only desirable, but absolutely necessary in the fair and uniform adjustment of demurrage claims and the uniform application of car demurrage regulations.

Mr. Voorhees says that "today the railroad agents and their customers are in closer touch, resulting in a better understanding and much less friction than under previously existing conditions." This is all right so far as "friction" is concerned, but how about demurrage under this elysian condition? We have always been under the impression that where there is no friction in enforcing unpleasant regulations, the regulations are not very rigidly enforced. What we need, as stated before, is fair and equitable rules in the interest of the railroads, as well as shippers and consignees, and a uniform application of such rules, with a uniform method of passing upon claims based upon the exceptions provided by the rules.

In other words, *Uniformity* is the most important feature in

the application of demurrage rules, and we cannot see that there is any logical argument to the contrary; nor can we see how uniformity is to be obtained by each railway undertaking to interpret and apply the rules without joint and impartial supervision.

If the railways will not supply this joint and impartial supervision, the government will do so, and it is doubtful if the many small shippers will be content with anything short of governmental supervision of this feature of transportation, which is so peculiarly susceptible to manipulation.

I quite agree with your correspondent in Hartford, Conn. (C. H. M.), that the Peters bill, placing demurrage regulations under the control of the Interstate Commerce Commission, should be enacted by Congress.

PHILIP GODLEY,

Chairman Committee on Land Transportation,
Philadelphia Board of Trade.

MR. ISAACS ON RAIL FAILURES AND ECCENTRIC LOADING.

NEW YORK, May 2, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

There appears in the *Railway Age Gazette* of April 18, 1912, an article entitled, "Rail Failures Due to Eccentric Loading," by C. A. Morse, chief engineer of the Atchison, Topeka & Santa Fe. Photographs are shown of the "split head" type of rail failure and the assumption is made that these failures are caused by "eccentric loading" produced by the conical face of the wheels in contact with the curved top surface of the rail.

Assuming, as Mr. Morse does, that the loads upon the head of the rail are vertical, the maximum bending moment due to these loads is the same upon the vertical portion of the head, considered as a cantilever or beam, as that upon the thinnest portion of the web, and as the web is very much thinner than the rail head, from theoretical considerations we should expect that eccentric forces causing failures would split the webs longitudinally at their thinnest section. In point of fact this last rarely occurs, and it has been clearly shown that if the metal in the head is sound it is ample in all sections now in use to stand any such eccentric loads.

This is established by a series of tests made by Mr. Wickhorst, engineer of tests of the Rail Committee (Proceedings of the American Railway Engineering Association, volume 12, part 2, pages 518 to 528). In these experiments the heads of rails were planed down to various thicknesses and subjected to static loads and the extreme edge and to rolling loads applied with a reciprocating machine along the edge. The conclusions drawn were, that a load of 30,000 lbs. (which is about the maximum wheel load in use today) caused a permanent sag with head $\frac{3}{8}$ in. thick, but not much, if any, with a head of greater thickness, and further, that a head $1\frac{1}{8}$ in. thick would hold up against permanent sag a rolling load of 90,000 lbs. when concentrated at the edge. No split heads resulted, which clearly indicates that eccentric loading plays little, if any, part in the failure of the heads of rails where the metal is sound. In my opinion split heads are the result of defective material in the head.

If split heads were brought about by eccentric loading, in sound material they would occur invariably on the gage side. Such is not the case. The position of the break is determined by other causes, but the existence of internal defects would be sooner made evident on the gage than on the outer side of the rail.

The cuts of split head failures in Mr. Morse's article are typical of those which have been most prevalent on our system for the last five years and are clear attributable to one of the three following causes: (1) An original pipe or unwelded cavity in the rail head; (2) lamination which may contain slag or other foreign matter; (3) segregation of carbon or other hardening elements at the center of the head, reaching

down into the web and forming a central core much harder than the surrounding envelope of soft steel.

That the first two of these, which largely predominate, should cause split heads is self evident and needs no comment. The third is explained by the rolling action of the wheels upon the soft metal on the surface of the rail head, which causes a transverse flow of metal and throws stresses into the harder and more brittle metal nearer the center to which it is not capable of adjusting itself. One of these three conditions can usually be detected in a split head. The upper right-hand section given in the article referred to particularly shows laminations throughout the rail section, which could hardly be brought about in sound metal by eccentric loading. The above causes for practically all such failures are brought out by chemical and microscopic surveys of the fractures which almost invariably indicate the presence of high carbon or slag.

I am not now discussing the advisability of coming wheels as against making them cylindrical. If there is anything to be gained as regards the avoidance of eccentric loading by the latter, the same result can be obtained by canting the rail toward the gage side, which is an old and now an abandoned expedient. With the top of the rail flat and the tread of the wheel cylindrical the tires would still be worn into concave surfaces, the load would still be applied, except on new wheels and new rails, at the edge of the flat topped rail so that under operating conditions there seems to be little, if anything, gained by this change of shape.

Formerly it was customary to give the rail head a much sharper curvature than is the present practice on the theory that it would avoid eccentric loading. In some cases this was carried to extremes. One road adopted a section in which the top of the head was nearly semi-circular. It is now recognized that there is a moderate curvature which gives about the best result.

In designing the "A" and "B" sections of the American Railway Association, this matter received careful attention by the committee and the radii of the heads were fixed at 14 and 12 in., respectively. This was considered as far in the direction of a flat head as it was wise to go, all things considered. Prior to this the American Society of Civil Engineers' section had used 12 in., and it was not an uncommon practice to use 10 in. It was recognized that as long a line of contact as feasible between the rail head and the tread of the wheel is desirable, but it was not considered wise by the committee to use a flat-topped rail or too wide a head, as this might bring about undue stresses upon the web or flange.

JOHN D. ISAACS.
Consulting Engineer, Harriman Lines.

The Russian government is considering the construction of the following lines: The extension of the Central Asia and the Caspian railways to Kaschugal; a line from Omsk, on the Trans-Siberian railway, to Tchugtchak; a line from Misovya, on the Trans-Siberian railway, via Kiahkta to Kulon. The object of these three lines is to develop Mongolia. They will be the first railways to reach those points.

Authority has been vested in the British Nyasaland protectorate government to contract with the British Central Africa Company for public lands to which the Shire railway is at present entitled, and to guarantee interest on the capital required to extend the Port Herald railway to the Zambezi river. The Portuguese government has been asked to consent to the passage of the railway through its African territory, and arrangements have been concluded with the Mozambique Company to build a section of the line from the Zambezi to the port of Beira. It is announced that the Portuguese government has given the consent requested and that arrangements for the construction of the whole railway are about concluded. Quelimane would be a much nearer exit to the sea for British Nyasaland, but against this factor the Mozambique Company presents in Beira an established harbor open to vessels of any draft at present plying on the east coast and whose port works are already in process of construction.

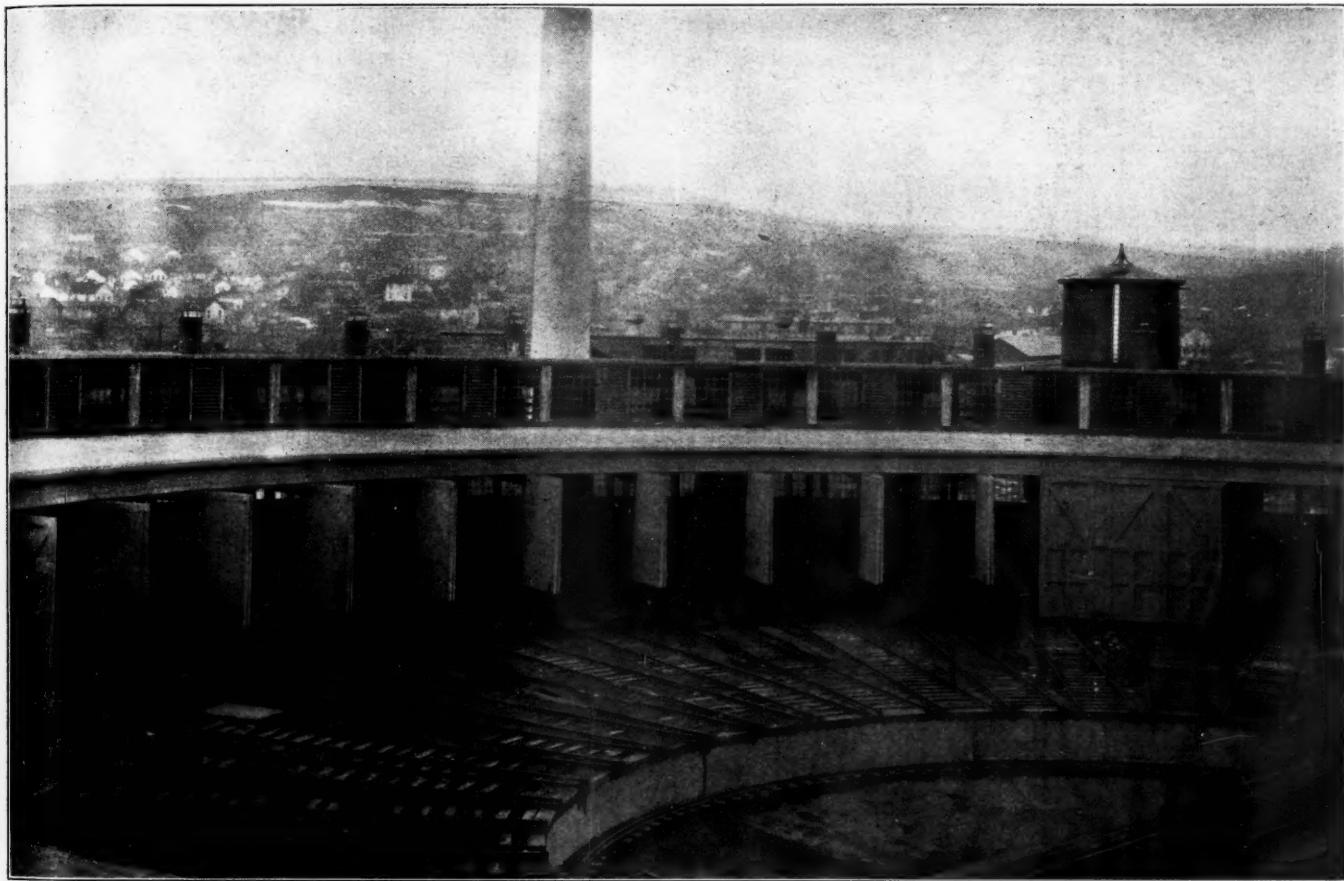
NEW LOCOMOTIVE TERMINAL AT CARBONDALE.

The Delaware & Hudson's Improved Facilities for Taking Care of Mallet Locomotives Used in Heavy Coal Movement.

The Delaware & Hudson has recently completed locomotive terminal improvements at Carbondale, Pa., which include an engine house of ample size for Mallet locomotives. Carbondale is the headquarters of the Pennsylvania division of this line, and the principal yard for the shipment of anthracite coal is located there. There is a heavy movement in both directions,

smaller engines, while the new house occupies the site of the older one to the south. To provide ample room for the new location a portion of the old classification yard was rearranged and the car repair shop was moved to the east side of the river.

The locomotive terminal improvements include, in addition to the large engine house, a coal chute, two concrete clinker pits,

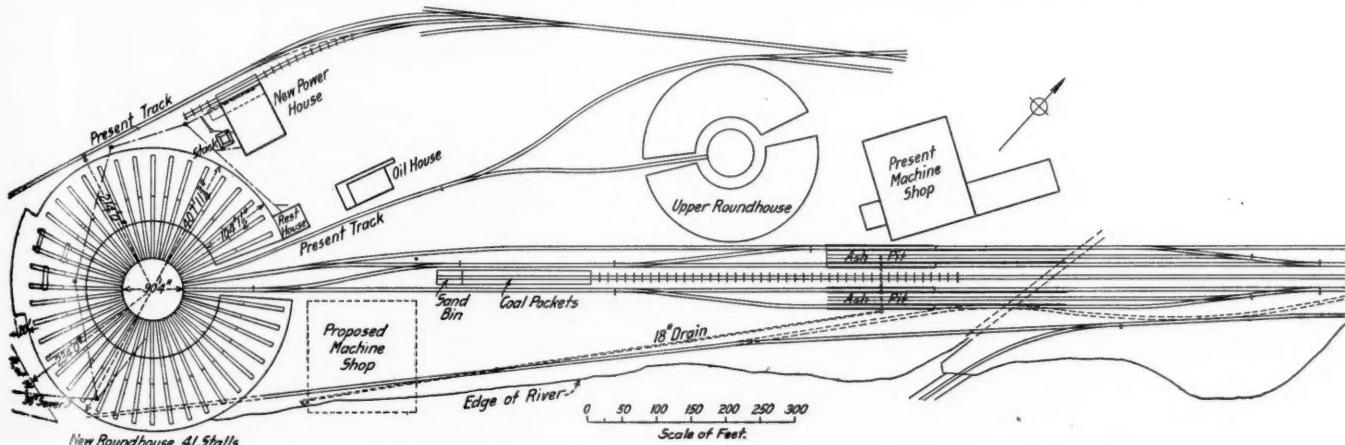


Partial View of New Engine House at Carbondale, Pa.; Delaware & Hudson.

and the Mallet engines are in service in this coal movement both north and south. The principal work is the pushing service to the summit of Mount Ararat, north of Carbondale. The old engine houses were not suitable for modern motive power, and the more recent one—that at the north—remains in use for

a power house, an oil house and a three-story building for offices and rest room. The arrangement of all these structures is shown on the general plan.

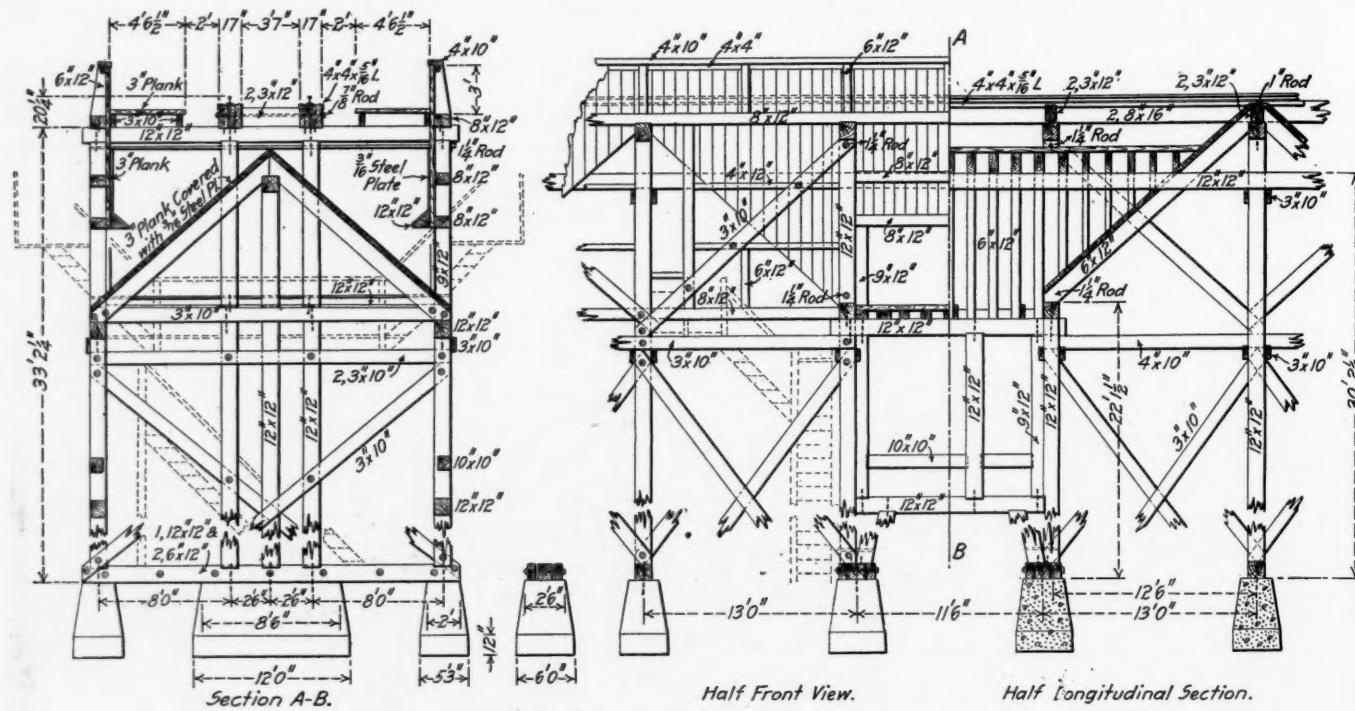
The new engine house has 41 stalls, and there are three tracks approaching the turntable. The inner circle has a diam-



General Arrangement of the Locomotive Terminal of the Delaware & Hudson at Carbondale, Pa.

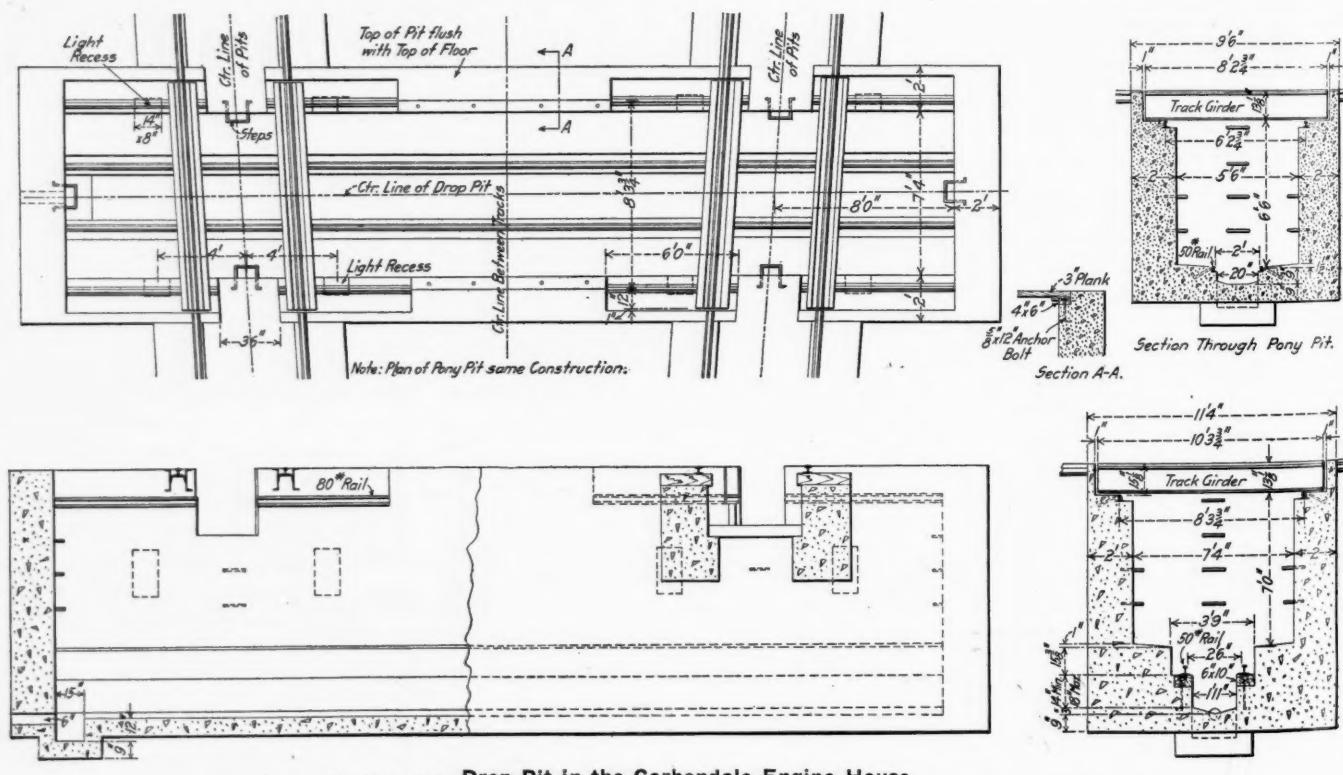
eter of 199 ft. 8 3/4 in., and the outer diameter is 407 ft. 11 3/4 in., giving a stall length of 104 ft. 1 1/2 in. This is adequate for the largest locomotives now in the service of the company, and for any which are likely to be built in the future. The foundation and substructure is of concrete, which extends to the top

The doors are made with solid wooden panels, but ample provision is made for lighting in the outside walls and at the louvre ventilator. Each stall has approximately 400 sq. ft. of window area in the outer wall. The space below the windows is filled with a reinforced concrete slab carried on projections from



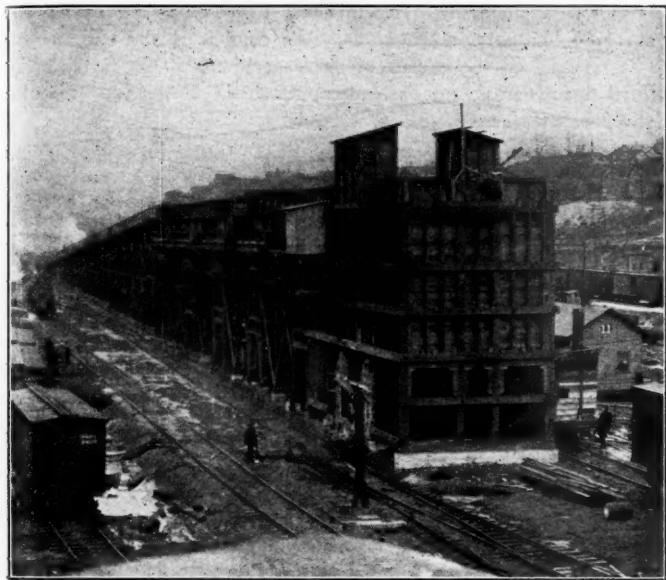
of the water table, 4 1/2 ft. above the top of the rail. Above this the walls are of brick with steel columns, and the roof girders are also of steel, although provision has been made for a cement covering for the steel work to prevent corrosion. On top of the steel roof girders are placed heavy wooden purlins, and on top of these 2-in. matched spruce sheathing which is covered with 5-ply slag roofing.

the piers which support the brick work in such a manner that this slab and the filling above the windows are practically independent of the roof structure, thus eliminating the danger of damage to the roof and main side walls in the event of an engine running beyond the pits into the outer wall. Directly opposite the main entrance are three drop pits, two for pony trucks and one for the drivers; and directly back of these is



a lean-to 20 ft. deep, extending along the width of five stalls. This provides room for sufficient machine tools for engine house use. The floor of the house is of vitrified paving brick laid on 5 in. of concrete with a 2-in. sand cushion.

The drop pit for drivers is here illustrated, and the one for trucks is made on the same plan but smaller, the width of the pit being 5 ft. 6 in. instead of 7 ft. 4 in. for the drivers. The wheels are raised and lowered by means of jacks, which run on rails at the bottom of the pit, and the rails at the top of the pit are supported by shallow trucks made of 12 in. channels. When the wheels are raised above the longitudinal rails covering

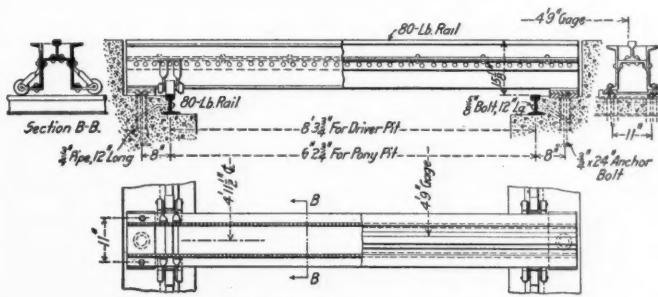


Coal Wharf at Carbondale, Pa.; Delaware & Hudson.

the pit, the latter can easily be moved out of the way, on their shallow trucks. The truck wheels, 4 in. in diameter and having 3 in. faces, are mounted on a $\frac{3}{4}$ -in. steel axle. The cast iron smokejacks were made by Paul Dickinson, Inc., Chicago; and the building is heated by a direct system of coils placed along the pits.

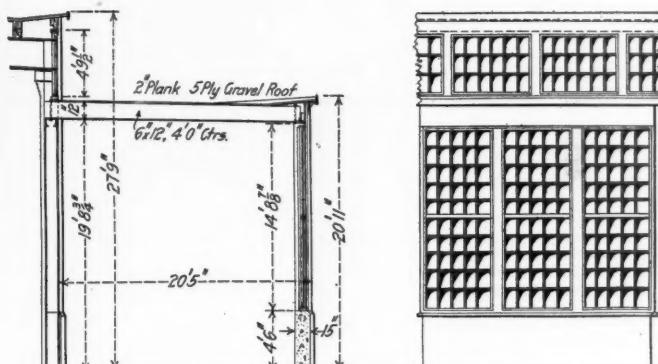
The new power house and chimney are illustrated in the photographic view. The power house is a concrete and brick structure, 66 ft. x 90 ft., with a roof construction similar to the engine house. The boiler room contains 800 h. p. Babcock & Wilcox boilers, with foundation space provided for an equal additional capacity. There is one Cochrane feed-water heater

and one Green fuel-economizer blower. The chimney is of reinforced concrete, built by the General Concrete Construction Company. The engine room contains an Ingersoll-Rand air compressor with cylinders 14 in. x 22 in., and 13 in. x 16 in. Fuel for the boilers is delivered to the power house by gravity from hopper cars on a trestle over the bunkers, and the ashes are



Drop Pit Track Truck.

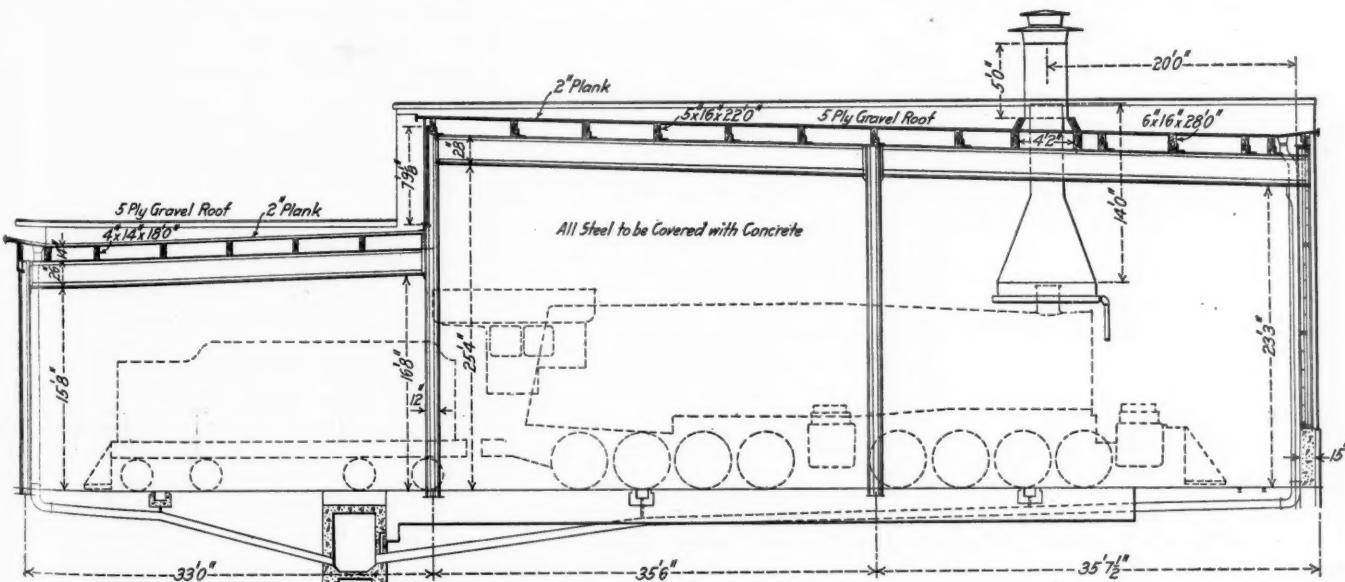
handled by special equipment through a tunnel from the firebox to empty cars on the same elevated track. The sand storage bin and dry kiln are also reached by the same elevated track. The coal wharf, which is built of wood on concrete foundations, has a light grade, long wooden trestle approach, and there is no roof



Lean-to; Carbondale Engine House.

over the coal bin. The coaling station has a storage capacity of 600 tons.

The boiler washing system was installed by the National Boiler Washing Company of Chicago, and the mains for this system, together with the air pipes, are carried on supports suspended from the steel roof girders, with drops at every other column.



Cross-Section Through the Carbondale Engine House.

The turntable is 90 ft. in diameter, with a cone roller center bearing, and was made by the American Bridge Company; it is equipped with a Nichols electric tractor. On the approach to the engine house is a three-story structure with a rest room and locker room on the first floor, and the master mechanic's office on the second floor.

ACCIDENT BULLETIN NO. 42.

The Interstate Commerce Commission has issued accident bulletin No. 42, containing the record of railway accidents in the United States during the three months ending December 31, 1911. The number of persons killed in train accidents was 242, and of injured 4,706. Accidents of other kinds, including those sustained by employees while at work, by passengers in getting on or off cars, by persons at highway crossings, by persons doing business at stations, etc., by trespassers, and others, bring up the total number of casualties, excluding "industrial accidents," to 22,682 (2,726 killed and 19,956 injured). The casualties are classified in table No. 1, given herewith, which includes some details from table 1B not here shown. (The accident statistics of electric lines are given in a separate table). Supplementing the statement of railway accidents proper, the commission gives the following records of "Industrial Accidents"; those occurring to employees of the railway on railway premises in which the movement of cars or engines is not involved:

Industrial accidents to employees.

	Killed.	Injured.
While working on tracks or bridges.....	25	4,537
At stations, freight houses, engine houses, coaling stations, water stations, etc., where no moving railroad car or engine is involved	22	5,466
In and around shops	9	10,028
On boats and wharves.....	7	365
At other places	15	1,238
Total	78	21,634

Adding the casualties to employees in industrial accidents to the figures given in the larger table, the total number of employees killed, including those not on duty, is 1,004, and injured 34,679; and this makes the total number of persons killed, all classes, 2,804 and injured, 41,590.

TABLE NO. 1A.—Comparison of principal items with last quarterly bulletin and with one year back.

	Bulletin 42.	Bulletin 41.	Bulletin 38.
1. Passengers killed in train accidents.....	27	65	30
2. Passengers killed, all causes.....	78	116	96
3. Employees (on duty) killed in train accidents	183	104	199
4. Employees (on duty) killed in coupling.....	53	42	60
5. Employees (on duty) killed, total (Table 1B)	850	626	841
6. Total, passengers and employees (items 2 and 5, above)	928	742	937
7. Other persons killed (including trespassers, non-trespassers, and employees not on duty), all causes	1,798	2,016	1,722
8. Employees killed in industrial accidents.....	78	131	107

The total number of collisions and derailments in the quarter now under review was 3,346, of which 244 collisions and 215 derailments affected passenger trains. The damage to cars, engines, and roadway by these accidents amounted to \$2,893,948, as below:

TABLE NO. 2.—Collisions and derailments.

Class.	Number.	Loss.	Killed.	Injured.
Collisions, rear	337	\$377,096	45	669
Collisions, butting	203	454,064	50	993
Collisions, train separating	78	33,372	3	43
Collisions, miscellaneous	808	391,104	32	673
Total	1,426	\$1,255,636	130	2,378
Derailments due to defects of roadway....	465	\$390,191	28	735
Derailments due to defects of equipment.....	925	735,791	19	341
Derailments due to negligence.....	111	62,381	3	133
Derailments due to unforeseen obstruction.....	75	106,293	19	135
Derailments due to malicious obstruction.....	18	36,906	5	101
Derailments due to miscellaneous causes....	326	306,750	26	309
Total	1,920	\$1,638,312	100	1,754
Total collisions and derailments.....	3,346	\$2,893,948	230	4,132
Total for same quarter of—				
1910	3,366	2,831,469	219	3,175
1909	3,206	2,733,830	220	3,731
1908	2,684	1,940,133	172	2,626

TABLE NO. 2A.—Derailments due to defects of roadway.

Cause of accident.	Number.	Killed.	Injured.	Damage.
Broken rail	115	14	356	\$163,922
Spread rail	70	2	64	32,055
Soft track	73	..	30	47,851
Bad ties	16	..	12	5,632
Sun kink	2	1	16	311
Irregular track	101	5	132	86,521
Miscellaneous	88	6	125	53,899
Total	465	28	735	\$390,191

Condensed accounts are given of investigations by the commission's inspectors of 14 train accidents, and of one accident where a freight train ran into a street car.

The *Railway Age Gazette* accident records for these three months were published December 1, page 1102; December 22, page 1284; January 26, page 154. We copy from the bulletin the facts relating to the causes of these accidents in so far as they afford information not already published. Following are the dates and places:

- October 9. Boston & Maine; Hampstead, N. H.; butting collision of freight trains about 3 a. m.; 1 employee killed.
- October 15. Missouri Pacific; Fort Crook, Neb.; butting collision, passenger and freight; 8 persons killed, 37 injured.
- October 16. Detroit United Electric; Volney Smith's crossing, near Detroit, Mich.; 1 passenger killed, 61 persons injured.
- October 19. Pere Marquette; Detroit, Mich.; butting collision; passenger and freight; 1 employee killed, 44 persons injured.
- October 20. Texas & Pacific; Marshall, Tex.; collision at division terminal; 1 employee killed, 24 persons injured.
- October 29. Fort Worth & Denver City; Bellevue, Tex.; derailment of passenger train; 1 employee killed, 40 persons injured.
- November 2. Erie; Smithboro, N. Y.; collision; 1 employee killed.
- November 9. Nashville, Chattanooga & St. Louis; Dalton, Ga.; butting collision; 1 employee killed, 4 injured.
- November 16. Northern Pacific; Spire Rock, Mont.; collision of passenger and work trains; 6 employees killed, 11 injured.
- November 18. Great Northern; Tunbridge, North Dakota; butting collision; 2 employees killed, 5 persons injured.
- November 22. Chicago, Rock Island & Gulf; Lively, Tex.; derailment of passenger train; 1 employee killed, 1 injured.
- November 23. Chicago, Rock Island & Pacific; Peoria, Ill.; street car struck by freight train; 13 persons injured.
- December 6. Pennsylvania; Manor, Pa.; rear collision of freights, and a third train derailed; 6 persons killed, 4 injured.
- December 9. Chicago, Milwaukee & St. Paul; Corliss, Wis.; butting collision; 1 employee killed, 9 persons injured.
- December 18. Chicago, Milwaukee & St. Paul; Odessa, Minn.; rear collision; 8 passengers and 2 employees killed, 23 persons injured. The report on this case was noticed in our issue of May 3, page 1010.

At Hempstead a westbound regular freight collided with an eastbound regular freight because of a misunderstanding of orders. The westbound train, No. 346, running from A to B, C, D, E, F, and G, received at A an order directing it to wait at B until 2:40 a. m. for No. 307, at E until 3 a. m. for the same and at F until 3:25 for No. 309. At C, about an hour later (2:03 a. m.) it received an order concerning four movements (three of which it had nothing to do with) and saying that No. 307 had right over 346 to F. The conductor and engineman of the westbound train erroneously "believed" that the second order annulled or superseded that part of the first order directing them to wait at E until 3 a. m., and they went on past E and collided with the eastbound train. All of the employees involved were experienced men. The inspector found that a new book of rules was adopted June 21, 1909, but that these trainmen had not been examined on those rules. (It does not appear that this had anything to do with their error).

At Fort Crook (Gilmore Junction) the conductor of an eastbound freight made a mistake in reading the register, before he started on his trip, and assumed that westbound passenger train No. 105 had cleared the single track, on which he afterward met it. He says he felt sure that 105 was in; also that he may have mistaken 155 for 105, or may have looked on the wrong date. The engineman should have examined the register, but he took the conductor's word. The register is at South Omaha. Thence to Gilmore Junction the line is double track and the essential thing to learn from the register was whether or not the passenger had reached Gilmore Junction and passed on to the double track. The freight conductor concluded not only that it had gone on to

TABLE No. 1.—CASUALTIES TO PASSENGERS, EMPLOYEES, AND OTHER PERSONS—OCTOBER, NOVEMBER, AND DECEMBER, 1911.

	Passengers.		Employees on duty.		Employees not on duty.		Other persons not trespassing.		Trespassers.		Total persons.	
	In- Killed. jured.	In- Killed. jured.	In- Killed. jured.	In- Killed. jured.	In- Killed. jured.							
Collisions	22	1,425	92	901	34	2	10	14	8	130	2,378	
Derailments	4	1,083	82	629	4	5	10	28	100	1,754		
Accidents to trains, cars, or engines, except collisions, derailments, and boiler explosions	33	1	227	8	8	77	2	5	3	350		
Bursting of, or defects in, locomotive boilers or boiler attachments	1	6	218	...	...	...	...	...	9	224		
Total train accidents	27	2,547	183	1,975	4	51	2	92	26	41	242	4,706
Accidents to roadway or bridges not causing derailment, such as fires, floods, landslides, explosions, etc.	3	20	...	...	...	1	...	...	3	21		
Coupling or uncoupling cars. (Does not include accidents with air or steam hose)	53	912	...	1	...	...	...	...	53	913		
While doing other work about trains (not in shops or engine houses) or while attending switches	37	4,931	...	...	...	...	...	...	37	4,931		
Coming in contact, while riding on cars, with overhead bridges, tunnels, or any signal apparatus, or any fixed structure above or at the side of the track	4	23	400	...	3	7	14	30	421			
Falling from cars or engines	11	85	117	1,574	2	11	19	102	113	232	1,802	
Getting on or off cars or engines	24	648	55	2,055	9	58	3	26	146	383	237	3,170
Other accidents on or around trains not here named	2	773	19	284	1	35	6	165	6	58	34	1,315
Being struck or run over by engine or car at stations or yards	9	30	208	354	30	32	36	67	294	270	577	753
Being struck or run over by engine or car at highway grade crossings . . . . .	...	...	1	...	4	220	623	46	45	266	673	
Being struck or run over by engine or car at other places	1	150	145	30	13	22	22	763	313	966	493	
Other causes	4	198	2	141	...	45	14	276	29	98	49	758
Total other than train accidents	51	1,738	667	10,817	72	202	301	1,199	1,393	1,294	2,484	15,250
Grand total	78	4,285	850	12,792	76	253	303	1,291	1,419	1,335	2,726	19,956

the double track, but that it had reached South Omaha before he was ready to start out. The collision occurred at 8:46 a. m. The engineman of the freight, being on the inside of a curve, saw the passenger train and brought his train almost to a stop. The passenger train was running 40 miles an hour.

The despatcher says that he had sent to the freight conductor a message (not an order) notifying him that the passenger train should pass Gilmore Junction (and enter double track) about 8:50 a. m. Both the operator at South Omaha and the conductor say that they did not receive this message.

The inspector found that the register at South Omaha, kept in the office of the yardmaster of the Missouri Pacific, was made up by information received over the telephone through the office of the Union Pacific despatcher. The M. P. trains use the tracks of the U. P. as far as Gilmore Junction. For example, a passenger train passes Gilmore Junction; the U. P. signal man notifies the U. P. despatcher at Omaha; thence the report is sent to the M. P. despatcher at Falls City, 100 miles south, and the despatcher there issues an order to the M. P. yard office at South Omaha to register the passenger train as having arrived at South Omaha at a certain time. This method, says the inspector, affords opportunities for mistakes and should be discontinued; the register should be kept at Gilmore Junction. The conductor of the freight said that he often had to call up the despatcher in order to learn if trains were in, and had been told to go out into the yard and look for them.

The collision on the electric road near Detroit was due to careless running where the rules required limited speed. The southbound cars were running on schedule No. 59, in three sections, one car constituting each section. The crew of the second section had orders to stop (on double track) whenever they met a certain crew coming north, and change off with them. This northbound crew was in charge of one of the three sections of northbound No. 60, but the southbound men did not know which of the three sections, and so they had to slacken speed on meeting the first and the second sections; the crew proved to be on the third. Thus second 59 had lost some time, and when it finally stopped to make the change it was run into at the rear, within 30 seconds after stopping. The time was about 8 p. m., and the weather is said to have been clear, though there had been fogs at certain points along the track. The motorman of third No. 59 did not know that the men on the second section were to change off. It is also said that he did not reduce speed when he ran into a fog bank. At the point where the men changed off there is a curve which, according to the rules, should have been approached at reduced speed, and also there is a slow board 700 ft. back. Trains are required to keep 3,000 ft. apart, but, says the

inspector, it is impossible to carry out this rule in dark or foggy weather.

The butting collision at Detroit, October 19, occurred at 3:40 a. m. A freight in the yard, disregarding an order to keep out of the way of an approaching special passenger train was left standing on a side track with the switch open; and the passenger train, coming on at about 40 or 50 miles an hour, ran over the switch and into the head of the freight. The freight conductor had been notified about 3 o'clock that the passenger would arrive at 3:30, but instead of promptly informing his engineman and brakeman, he remained in the office until it was too late to avert the collision. The passenger train came on at full speed, regardless of a semaphore signal 2,000 ft. from the switch which indicated that the switch was not set for the main track. In clear weather this signal could have been seen 3,000 ft. back, but on this night there was considerable fog. However, there were sufficient landmarks to enable the engineman to "pick up" the signal without difficulty.

In the collision at Marshall, Tex., a hostler in charge of a locomotive which had just been detached from a passenger train ran it through the yard at a speed of 12 to 20 miles an hour and met a freight coming in without a headlight. The hostler reversed the engine, opened the throttle and jumped off; he also released the air brake; and the engine ran back and collided with another passenger train; and a switchman at the rear of that passenger train, engaged in coupling a yard engine to the passenger cars, was killed. The hostler is censured for not having stuck to his engine, and for running too fast. The roundhouse fireman, who was on the engine, had been advised of the absence of a headlight on the incoming freight, but he had not given this information to the hostler.

The derailment at Bellevue, Tex., was due to the loosening of a rail joint; supposed to have been malicious. It occurred at 10:35 p. m. Section men had passed over the track on a hand car a half hour previous.

The collision at Southboro, N. Y., November 2, at 7:59 p. m., was due to the neglect of the engineman of a freight, who ran past distant and home automatic block signals and struck another freight on a crossover. This last-mentioned train had sent out a brakeman with a lantern, which he swung. A brakeman on the other train was riding on the engine and told the engineman that he had passed a flagman. The engineman (who was killed) continued, heedless, and then the brakeman crossed over to the engineman's side of the cab, but not in time to prevent the collision. The inspector holds him at fault for not promptly taking charge of the engine when he saw the engineman's neglect.

The collision near Dalton, Ga., was due to the failure of a tele-

rapher to deliver an order. This collision occurred at 7:30 a. m., northbound extra, 174, meeting southbound regular freight No. 19. No. 19 encroached on the time of the other train by reason of not having received the meeting order. The telegrapher had delivered a copy of the order to train No. 7 and admitted his signature on it, yet claimed that he did not remember copying it or delivering it to No. 7. His carbon copy has never been found. The despatcher is censured for sending to Dalton a meeting order requiring trains to meet at that point when he might have sent it to another station. According to the rule he should have sent the order to one of two other offices and also have sent a copy to the operator at Dalton, that being the meeting place.

The collision at Spire Rock (Pipestone), Mont., was due to a misunderstanding of flagging instructions. A work train consisting of two platform cars and a caboose, with the engine at the rear, met an eastbound passenger train in a deep rock cut, on a curve of 11 deg. Two light engines and the passenger train were due from the west. The flagman, asking if it was time for him to go out with his signals, was told by the conductor "yes; flag the helpers" (the light engines). When the passenger train came along the flagman boarded its engine, and when asked by the engineman if he was ordered to hold the passenger train replied in the negative. The work train conductor (who was killed) seems to have thought that his train was being protected against the passenger train; but there had been no suspension of the rule requiring him to keep clear of passenger trains at all times.

The collision at Tunbridge (Rugby) was between a westbound freight and an eastbound mail train, the latter having only two cars, one a mail and one an express car. This collision occurred about midnight and in a hard snow storm. The freight ran past the station at which it should have waited for the eastbound train, the engineman having forgotten about the eastbound train. The fireman had taken no interest in the question of the right to the road, as against the eastbound train, and the front end brakeman said he thought (assumed) that his train had been given time over the eastbound. The freight conductor was in the caboose and did not notice when he passed Tunbridge. He claims to have told the engineman that they should have to wait at Tunbridge for the eastbound train, but the engineman denies having had any such conversation. The eastbound train had an electric headlight and the engineman of the westbound saw it in season to bring his train to a stop; but his own headlight was an oil burner.

The derailment at Lively, Tex., was caused by the breaking of a switch rail 15 ft. long. Nothing is said about the quality of the rail or the character of the break. The baggage car and the smoking car were of steel, and their strong construction is believed to have contributed to the safety of the passengers.

The street car struck by a freight at Peoria, Ill., was run on to the railway crossing by its motorman regardless of the rule requiring him to stop and allow the conductor to go forward. The crossing in question has gates but they are not used at night or on Sunday. This accident occurred at 10:15 p. m. The freight train was running at 15 miles an hour; and the inspector says that a lower rate of speed should be required in the city of Peoria. He also says that there should be a derail in the street car track.

The accident at Manor, Pa., was primarily a rear collision of freights, but the wreck from this collision fouled another track and a train of express cars ran into it. The inspector says the collision was primarily due to the failure of a flagman to go back, and that the engineman's fault was "contributory." In point of fact, this engineman ran past two distant and one home automatic signals, the outer distant signal being 6,654 ft. east of the home signal. He seems to have reduced his speed at both of the distant signals, and just before he reached the home signal he saw the flagman; but the rails were slippery. The grade descends at about 1 per cent.; the rate of speed is not mentioned.

The accident at Corliss, Wis., was due to forgetfulness on the part of the men in charge of a freight train and (apparently) disregard of electric indicators at switches. The collision occurred at 6:23 p. m. during a dense fog. A cautionary bulletin calling

attention to the fog had been issued and the attention of the engineman of the passenger train had been called to this bulletin. The freight consisted of only an engine and a caboose. To go west it had to cross the eastbound track on which the passenger train was approaching. At the entrance to the main tracks there was a switch indicator. There is an automatic home signal a half mile west of the switch and a distant signal a mile farther. The switch indicator indicates the approach of trains at a point 2,000 ft. still farther west, or nearly two miles. The conductor, receiving from the despatcher his order to proceed, neglected to instruct his brakeman to flag against the passenger train, having forgotten that such a train was due. He had been in to the telegraph office and checked the register, as regards westbound trains, but not eastbound. He had never been examined on the automatic block signal rules and said he understood the automatic signals would protect him. The engineman of the freight was killed in the collision. The front brakeman of the freight says that the switch indicator showed "that the block was clear," and that his train started from the side track "about five minutes" after he had thrown the switches. This brakeman had had experience on the Pennsylvania, but had been on the Milwaukee road only three months. He had no copy of the block signal rules, nor even of the time-table, although he said he had several times asked for one. He did not know that No. 12 (the passenger train in question) was on the time-table. The rear brakeman threw one of the three switches, but without looking at the switch indicators. He had forgotten about No. 12 until he heard it coming. The engineman of the passenger train said that the distant signal, when he passed it, indicated clear. At that point he was running 55 miles an hour, and at the home signal, 60 miles an hour. The home signal was against him and he set the brakes in emergency. He could see only about 150 ft. ahead and jumped off when he saw the freight engine. The operator at Corliss had no carbon copy of the clearance card issued to the freight, although the rules require copies to be kept. He said the conductor asked him nothing about eastbound trains, and he said nothing to the conductor about No. 12, although he knew that it had just passed the last station west of Corliss.

Electric Railways reporting to the commission (not included in the foregoing statistics) had 90 persons killed during the quarter and 1,062 injured; and there were 42 collisions and 23 derailments. Train accidents are charged with 10 fatalities—four passengers and six employees killed in collisions. The total number of passengers killed from all causes was 10, and of employees 21 (5 in industrial accidents). The number of trespassers struck or run over by cars was 48; 30 killed and 18 injured.

When the Hauenstein tunnel in Switzerland was begun the workmen struck for higher wages. The strike was settled by an agreement with the several workmen's unions that for one year the wages should be as follows: Workmen employed outside: masons, 14 cents per hour; laborers, 9 to 10 cents; hod-carriers, 7 to 9 cents, with a ten-hour day. For men engaged inside the tunnel, \$1.20 per eight-hour day will be paid to miners and masons, and \$1 to laborers removing debris, etc.; 14 cents an hour for carpenters, and 10 per cent. more for overtime; 50 per cent. more for Sundays, and double pay for night work.

The standard gage for Portuguese East Africa is the South African gage of 3 ft. 6 in. This gage obtains in most of the new railways recently undertaken by the government as it utilizes the material and rolling stock discarded by the main Lourenço Marquez-Johannesburg line. This main line is now introducing American locomotives of the Mallé type. English and German locomotives are also in use as well as coaches and rolling stock from the same sources. Many of the trucks are of Portuguese manufacture. American manufacturers interested in the railways and port works of Mozambique province should address communications and literature to A. Direcção do Porto e dos Caminhos de Ferro, Lourenço Marquez, Portuguese East Africa.

ANNUAL MEETING OF THE AIR BRAKE ASSOCIATION.

Convention Report, Including Papers and Discussions on Hose Failures and on Wear of Shoes as Affected by Wheel Loads.

The nineteenth annual convention of the Air Brake Association was held at the Jefferson Hotel, Richmond, Va., May 7-10, W. P. Huntley, general foreman of the Chesapeake & Ohio at Ashland, Ky., presiding.

THE JOB BEHIND THE CLEANING DATE.

After the opening exercises a paper on The Job Behind the Cleaning Date, by C. P. McGinnis, was read by his successor on the Soo Line, H. A. Clark. It relates to the remarkable results accomplished by Mr. McGinnis, in the past two years, in improving the air brake service by careful inspection of the freight brake equipment, systematic testing and cleaning of triples and brake cylinders, and the providing of proper facil-

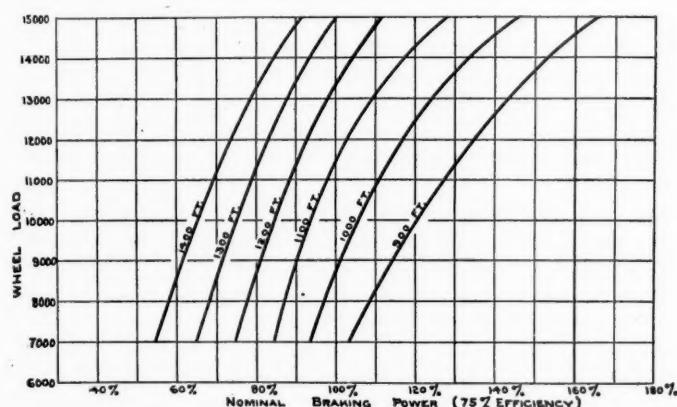


Fig. 1—Braking Power Required to Make Stops from 60 m. p. h. for Various Wheel Loads; Steel Tired Wheels.

ties for the purpose. This work has proved so important that representatives of other lines have gone to the Soo yards to inspect and study the methods used.

In the discussion the Pennsylvania method of testing the leakage of brake cylinders by gage and limiting the leakage to 5 lbs. per minute was generally commended; this practice is extending to other lines and its general adoption was strongly urged. It is difficult to comply with federal laws relating to air brakes and maintain 85 per cent. of the brakes on a train in good order without a well organized system of tests and inspection.

LIGHT AND LOADED AIR BRAKE EQUIPMENT.

W. V. Turner, of the Westinghouse Air Brake Company, gave an illustrated lecture on Recent Air Brake Developments. It dealt more particularly with the improved brake for light and loaded freight cars, and excited such unusual interest that this brake equipment will probably come into more general use.

Discussion.—C. C. Farmer described the successful operation of this system on the Bingham & Garfield in the copper region of Utah. Here 40 loaded cars weighing 3,040 tons are handled safely on a 16 mile grade, 3.2 per cent. maximum. The operation of the trains was one of these most difficult problems encountered by the air brake company. This equipment has also been applied to 500 cars on the Denver, North Western & Pacific, and there are a few in use on the Santa Fe, the Baltimore & Ohio, and the Southern Pacific. Representatives from these lines reported it working successfully and without any unusual difficulties. On account of its great advantage in increasing the percentage of brake power to the weight of the train it is expected that the use of this brake will extend to lines in level districts as well as on the heavy mountain grades, and it will be especially useful on 50-ton coal and ore cars.

AIR HOSE FAILURES.

A committee report on this subject, presented by T. W. Dow, chairman, directed attention to the great increase in the bursting and blowing off of the hose from the fittings. Careful observations on a large railway during the past summer indicated that these troubles are worse during the hot weather than during the winter months. While a number of suggestions have been made as to why the difficulties with air hose have increased so greatly during the past few years, there seems to be little question but that it is largely due to the use of poor and inferior material. There is also no question but that a good grade of rubber could be supplied if the railways were willing to pay a higher price for the hose. It was suggested that the Master Car Builders' specifications were not severe enough and should be revised. Also that far better results would be obtained by buying the hose on a service basis rather than on specifications which make no reference to the service results which must be obtained. A considerable amount of trouble is experienced because of frozen or stiff hose, and it is believed that this could also be remedied by using better material. In order that prompt and effective results may be obtained in remedying these difficulties it will be necessary for all the roads to work together as a unit, and it was suggested that the Master Car Builders' Association take some step to bring this about.

Discussion.—Part of the discussion related to the hose blowing off of the nipple, but the principal interest was attached to the quality of the hose. In passenger service, with long cars and short cross-overs, there is such a large lateral movement of the car ends that the hose is pulled off, even with proper holders which provide for a free lateral movement. Some lines limit the service of passenger brake hose to six months, and it is then used in freight service; others make a longer limit and then scrap the hose entirely. They also test the hose on passenger engines with soap suds daily.

The northern lines still have trouble from rigid hose in very cold weather, and it is often necessary to remove hose from

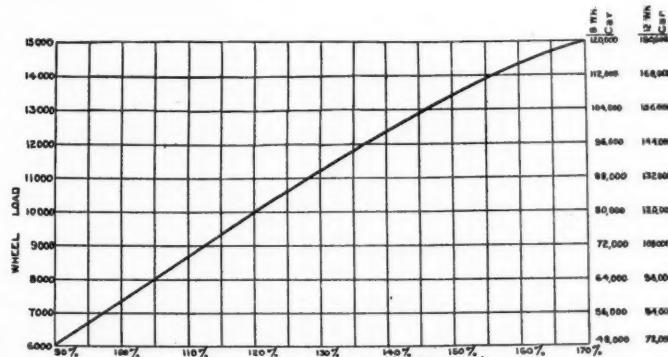


Fig. 2—Relative Braking Power Required for Cars of Different Weights to Produce the Same Retarding Force or Length of Stop.

freight cars after six months' service in severe winter weather. The inferior quality of the rubber, especially that in the inner tube, was discussed at length, and it was generally admitted that the price usually paid was too low to secure rubber of good quality.

The M. C. B. specifications should be revised in several particulars, especially in requiring a high tensile strength for the rubber, so as to more effectively exclude poor rubber. Metallic coverings for air hose were approved by some, and by others it was even suggested that a complete metallic flexible coupling be used for passenger cars instead of rubber hose. Considering

the short life of rubber and the expense for hose of good quality, it is possible that a metallic pipe union would prove economical in the end. Attention was directed to the importance of storing hose in a dry place where the temperature is not too high.

UNDESIRED QUICK ACTION OF FREIGHT TRIPLES.

J. W. Walker read a paper on this subject in which he analyzed the cause of the trouble known among trainmen as "kicker," "snapper" and "dynamiter," due to the emergency application when service stops only are desired. The numerous causes of the abnormal action of the triple, because the auxiliary reservoir pressure cannot reduce as fast as the brake pipe pressure falls, are listed on the chart below.

Weather conditions:

- Unequal expansion of different metals.
- Freezing of moisture.
- Gumming up of excess lubricant.

Lubricant:

- Too heavy.
- Too much used.

Feed valve:

- Sluggish.

Engineer's brake valve:

- Condition of—
Preliminary exhaust port too large.

Equalizing piston:

- Dirty.
- Gummed up.
- Tight.

Conical end of piston stem filed off.

Removal of exhaust fitting.

Manipulation of—

- Lap, allowing brake pipe leakage to
Apply brakes.

Open graduating valve.

Partial emergency position used for service.

Too light preliminary reduction.

Equalizing reservoir:

Leaky.

Volume reduced by water, etc.

Too small.

Choked passage between equalizing piston chamber and equalizing reservoir.

Brake pipe:

- Leaky.
- Long.

Conductor's valve:

Attempted service application with.

Triple valve:

- Restricted service port in body or passage to brake cylinder.
- Restricted service port in slide valve.

Dirty.

Gummed up.

Excessive friction of slide valve.

Tight piston.

Restricted feed groove.

Piston makes tight seal on bush.

Gun on piston bevel.

Graduating valve spring catching in bush.

Weak graduating spring combined with excessive friction.

Piston travel:

- Short.

Most of these causes can be removed if the brakes are properly maintained. The paper describes a device for locating triples which produce undesired quick action, the invention of C. L. Courson. It consists of an indicator placed between two hose couplers, so as to couple in the train line. When several of them are placed in a train line and brakes are applied, the needle on all the indicators will point in the direction from which the quick action started, and by a process of elimination the defective triples are located.

Discussion.—It was generally agreed that the use of dry graphite as a lubricant for the triple slide valve was the best remedy and has overcome most of the trouble so far as it relates to the triple itself. Air brake students are of the opinion that triples should be so improved that these difficulties will be removed and Mr. Turner, of the Westinghouse Company, said that that company had designed an improved triple which would not apply the emergency unless desired.

FRICITION AND WEAR OF BRAKE SHOES AS AFFECTED BY THE WHEEL LOAD.

R. C. Augur, engineer of tests, American Brake Shoe & Foundry Company, read an elaborate report on this subject.

The first part of the paper gave an interesting historical account of brake shoe tests and of brake tests. It showed the loss in efficiency by increased brake shoe pressure and included diagrams illustrating the present conditions in express passenger service. The author proposed a rational sliding scale for proportioning the braking power, the development of which is as follows:

The time has come when a sufficient mass of positive and usable data have been accumulated to enable us to say that the method used for so many years of proportioning braking power on passenger cars to 90 per cent. based on a brake cylinder pressure of 60 lbs. is no longer tenable and must become obsolete in the immediate future. Even though our methods have given good results in the past under other conditions, the situation today has so changed that practice must now be made to agree with known facts. If we wish to operate our passenger trains with smoothness and safety we must adopt a rational sliding scale for proportioning the braking power.

Diagram 1 shows the amount of braking power required to make machine test stops from a speed of 60 miles per hour in a certain distance with different wheel loads. These curves will vary, of course, with different shoes, and had shoes of lower frictional qualities than plain cast iron or Diamond "S" been used, they would have been further to the right and have shown the necessity of higher percentages of braking power for the same length of stop. The general character of the curves would have been the same, however. Similar curves for stops from a speed of 40 miles per hour might have been included, but they would not have brought out the facts any clearer as the angle of slope is essentially the same, although the distances in feet are less.

Diagram 2 shows the percentages of braking power which are necessary to insure essentially the same retarding force or length of stop with cars of different weights. To illustrate the way the diagram should be used we will assume that we have an eight-wheel coach weighing 69,000 lbs. By consulting the diagram we find that the braking power should be 110 per cent. If, on the other hand, we had an eight-wheel coach weighing 104,000 lbs., we find that the diagram calls for 146 per cent. braking power. By adopting a sliding scale such as this in proportioning braking power for passenger cars, stops will be shorter and smoother, while the danger of the wheels sliding under abnormal conditions will be decreased. These are features appreciated by the traveling public, and are also desirable from the viewpoint of the air brake and the transportation department.

The results shown on Diagram 2 can be expressed very nearly by the following formula, the assumption being made that 90 per cent. is a satisfactory braking power for the light cars having a wheel load of 6,000 lbs.

$$\text{Percentage of Braking Power} = 90\% + \left\{ \frac{\text{Weight of car} - 6,000}{\text{No. of wheels}} \right\}$$

Stated in another form, this means that for every 100 lbs. increase in wheel load in excess of 6,000 lbs., an addition of 1 per cent. braking power should be made. In calculating braking power for baggage cars it is desirable to add 15 per cent. to the weight of the car for the load carried, and base the braking power on the assumed loaded weight.

In all of this discussion we have not referred to the acknowledged advantage of having the emergency braking power in excess of that used in service application. This difference is desirable on all weights of cars, but is of increasing importance with very heavy equipment. What we have desired to emphasize is that the braking power should be proportioned in accordance with the laws of brake shoe friction and that this calls for increasingly higher percentages of braking power as the car weights are increased.

While the subject of brake shoe friction is a vital one in con-

nexion with the design of car brakes, the rate of wear of brake shoes is one that is ever with us, as it affects operating costs. In the effort to obtain increased durability and consequently reduced costs, there has been a marked tendency on the part of many roads to use shoes of rather low frictional properties, not realizing that the saving is more apparent than real. On the other hand some of our largest systems appreciate the fact that brake shoes are used to do work, that other things besides durability are essential and that they are not applied simply as ornaments or to permit cars to be interchanged. If the work is done shoes will wear out and all that we should ask is that they render a good return for the investment. It is not the part of wisdom for a road to apply the latest improved brake mechanism and increase the braking power so that good stops can be made and then defeat what has been gained by selecting brake shoes solely because of their durability.

The paper closes with a discussion of brake shoe wear. Mr. Walker believes that we are going beyond brake shoe pressures which are good practice and mentioned experiments which are being made with clasp brakes which may have an important bearing on future practice.

Discussion.—The paper was discussed at length by S. W. Dudley of the Westinghouse Air Brake Company, who showed that while 90 per cent. of the brake power was applied to the shoe only 10 per cent. was realized in efficient work in stopping the train, and the principal loss was due to the brake shoe. The coefficient of friction which is usually only 10 to 12 per cent. in passenger service, was the real measure of brake efficiency and some improvement should be made in the methods of brake shoe application to increase his efficiency.

W. L. Burton, of the Westinghouse Air Brake Company, then described verbally the clasp type of foundation brake gear for heavy passenger cars, and presented drawings of such gear as applied to four and six-wheel trucks on the Philadelphia & Reading. This gear has been in successful use on that road for about two years, and a service of 12,500 miles per brake shoe is obtained. The total leverage is 9 to 1, and as the usual load on the brake shoe is divided by two the wear is reduced and there is much less heating of shoes than where only one shoe is used per wheel.

W. V. Turner regarded these two papers—that of Mr. Augur and of Mr. Burton—as so important that the subject should be followed up, and it was decided to appoint a committee to further develop the proposed improvements, and report next year.

WESTINGHOUSE PC EQUIPMENT.

Thomas F. Lyons, of the Lake Shore & Michigan Southern, read an extensive paper on this subject in which he brought out the results obtained from the PC equipment in road service in the past few years, and explained in a general way the proper methods of train handling and the care and maintenance of the equipment. In closing he said:

"In conclusion it can be said that the PC equipment has fulfilled all the requirements laid down after the Toledo tests by the air brake supervisors of the New York Central Lines, and also that it does accomplish what was required by the railroad conference held in Pittsburgh in 1909.

"It is essential, however, that the truck and foundation brake gear be of such a design as to withstand the enormous pressure developed by the PC equipment. If this is done, it will only be necessary to state what stopping distance is required above 800 ft. at 60 m. p. h. in order to have it accomplished. As the matter now stands we cannot be sure whether the forces developed are being applied properly or not; that is to say, the trucks tilt, changing the weight on the wheels more or less, the springs are pulled down together, there is longer piston travel, and in various ways the forces are distributed in a detrimental manner. This, of course, largely defeats the object and may result in abnormal stresses in the train, flattening of wheels, etc.

"There can be no question but that the PC equipment will meet all the requirements of service braking and develop all the force required for emergency; but for these features to operate effectively, it is essential that it should have the proper foundation to work upon, and for this, it is not out of place to ask this association to put forth its best efforts to secure such truck and foundation gear design as will meet the requirements."

Discussion.—The discussion related principally to the manner in which the engineers reduced pressure in applying the brake when the PM and PC brakes were mixed in a train. Much of the difficulty from the flat wheels was due to improper application, and in not carefully following the instructions for the use of these brake equipments.

PIPE AND PIPE FITTINGS.

P. H. Donovan read a paper on this subject which related more particularly to the air brake piping on locomotives. It gave the results of an exhaustive investigation made by the Westinghouse Air Brake Company to determine the effect of elbows and pipe fittings on the service operation and quick action of the brake. It was shown that the ordinary data relating to air transmission in pipes does not apply to brake operation and is misleading if so applied. To secure proper brake action the pipes and fittings must be such as will insure a drop of pressure in the brake pipes at the rate of 8 lbs. per second.

AN APPRECIATION.

Following this discussion the executive committee presented the following resolution relating to W. V. Turner, which was unanimously adopted:

"Resolved that as Mr. Walter V. Turner, chief engineer of the Westinghouse Air Brake Company, has devoted so much of his time and efforts towards the welfare and usefulness of this association, it is the sense of this association that a suitably engrossed resolution of appreciation be presented to Mr. Turner as a tangible recognition of our esteem and of his ability and genius."

In response Mr. Turner gave an interesting account of his career in connection with his work in developing air brake equipment.

OTHER BUSINESS.

Brief addresses were made by J. F. Walsh, general superintendent of motive power of the Chesapeake & Ohio, and J. E. New of the Norfolk Southern.

The following officers were elected: President, H. A. Wahlert, Texas & Pacific; first vice-president, W. J. Hatch, Canadian Pacific; second vice-president, L. H. Albers, New York Central; third vice-president, J. T. Slattery, Denver & Rio Grande; secretary, F. M. Nellis, Westinghouse Air Brake Company; and treasurer, Otto Best, Nathan Manufacturing Company. St. Louis was selected as the place of meeting for next year.

At a meeting of the German society of mechanical engineers last February, Herr Hammer, after reporting on the locomotives shown at the recent Turin exhibition, Italy, and recounting the improvements introduced in recent years, named as follows the particulars in which still further improvement is to be sought: Higher steam pressure; the use of steam more highly superheated; improvement in valve gear; utilization of the heat which now escapes through smoke stack, etc.; purification and preheating of feedwater; all with the least possible multiplication of parts.

A contract between the Philippine government and the Manila railway was signed on January 23, which binds the government to furnish funds for the extension of the railway in the south of Luzon. The total advances for this work will eventually amount to \$2,250,000. The section covered by this contract lies between Lucena and Legaspi, 110 miles, and the projected line will include a branch to connect the through line with a new port to be established on the east coast of Luzon.

AN "INTER-RAILWAY INSTITUTE OF TECHNOLOGICAL INVESTIGATION"

BY A DIVISION ENGINEER.

The statement by a prominent lawyer to the effect that the railways of the United States could save \$100,000,000 annually, by making use of such economies of management as are in force generally in industrial enterprises, is of too recent origin to require more explicit mention.

To the conservative railway manager who continuously strives to reconcile demands for wage increases, on the one side, with demands for dividends, on the other, demands for low freight rates and lower passenger fares with demands for fast freight service and increased elegance of passenger equipment, increasing scarcity of labor with demands for better roadbeds and heavier rail, optimism in regard to this saving is difficult. The actual amount may be dropped from serious consideration because it was in all probability used by the author in a relative sense only, as a means of conveying in a concrete way the assertion that stupendous savings are possible.

The railway official is chiefly interested in the truth or fallacy of this general hypothesis on which the statement was founded.

Which is better managed: the railway or the industrial enterprise? Is there a fighting chance, independent of the foregoing question, to better the methods now in practice of managing the railways? If so, the railway officer wants the opportunity to improve his method, and he wants it now.

True criticism involves the naming and application of the curative. A great deal has been said and printed during the past year about "efficiency" and "scientific management," chiefly of industrial enterprises. Thought has grown and expanded along these lines as means of increasing profits in the face of stationary or even decreasing prices. The factory superintendent has a perfect outfit of machinery; his trade cannot well be increased; profits are very small; cost of raw materials is rising, threatening to wipe out the already small margins of profit; the only means of increasing profits without large initial outlay for facilities is improvement in methods of production. The efficiency expert is abroad in the land in answer to this general industrial need. By study of the details of the methods of working, you may be able to show your "hands" how 10 or 20 or 30 per cent. of their steps may be saved with resulting benefit to yourself, and the employees. Your factory may thus be made to produce the same volume of finished product at much less cost and without any other outlay than the time and thought necessary in evolving the method and instructing your workmen in it.

To all other advantages you may surely add increased respect of your staff for your business acumen, and this means much. Every man enjoys success, whether his own or his employers'; he glories in being concerned in useful work. He abhors working for a weak concern and will not do his best for it.

We hear that bricklayers under the efficiency system, by assuming the proper positions and making correct and no superfluous movements, lay more brick per day; shovellers move more material in an hour. Bricklayers, shovellers and artisans of many kinds are in railway service. Have railway men attained 100 per cent. efficiency?

E. D. Klyce, in an article in the *Outlook* for November 18, entitled "Scientific Management and the Moral Law," says truly:

"In almost all industrial establishments, the employer knows far too little about the details of each part of the work under him; that is left to the employee. Therefore, there are hundreds of different ways of doing the same little job in different parts of the country, and hundreds of different types of tools are used."

"Obviously, there must be one best way, and one best tool for each job. It was clearly up to the management. The management of an establishment takes upon itself four new duties.

"The first is to develop a science for each element of a man's work, writing out minute instructions as to just what the workman should do to get the best and greatest results; and to provide the best available tools.

"The next is scientifically to select, and then train, teach and develop each workman.

"The third duty is heartily to co-operate with the workman so as to insure the work being done in accordance with the principles of the science.

"And the last duty of the management is to take over all the work for which it is better fitted than the employee.

"This means minutely planning and recording the work and providing and using an immense amount of scientific data."

The application even in a small factory of these four rules, the third including a system of liberal bonuses, would mean at once a large expenditure of money, time and trouble; as anyone who has given the matter even a half hour's serious consideration may readily understand.

Rule 1 does not seem impossible of gradual application. Rule 2 reminds one of the difficulties of the maid servant problem. Rule 3 savors of altruism, while Rule 4 is clearly "keeping tab."

If difficult of application in a small concern, what would it mean to install this system in the managements of the railways of this country?

The employees are legion, the number of officers enormous, the territory covered is immense, the business done is stupendous, the investment is so great as to be almost inconceivable, even in this six cypher era of "high and frenzied finance."

The business of dealing in a rapid transportation of passengers and goods is so important to our nation's life and progress that twenty-four hours' interruption to the traffic of any important railway is far reaching in damage and discomfort; while any circumstance creating even a partial general tie up of the railways is in the nature of a national calamity.

The management of the railways has grown with them. A system has been evolved in these sixty odd years of experience under the keen scrutiny and tutelage of not a few of the master minds of America looking to the best interests of the investors and of their railway properties.

With so many distinct and competing companies doing business year after year, and side by side, the fittest method of management has of necessity survived. To improve on this system is no mere brick laying proposition; no cleaning up of the mismanagement of some small business doing one sort of work with one class of labor. It is a grave problem to attempt an application of four factory rules to the direction of 240,000 miles and lines of rapid transit carrying to and fro, over a territory of nearly three and three-fourths millions of square miles extent, the men and merchandise of a great nation.

There have grown up many wide differences of management between railways and the so-called industrial enterprises, as natural results of the differences in character of the business transacted. Let us examine Mr. Klyce's statement that "In almost all industrial enterprises the employer knows far too little about the details of each part of the work under him; that is left to the employee." If we add "and minor officers," the statement applies more closely alike to the larger industrials and the railways. The employer knows far too little about the details. I venture to say that this sentence embodies the very greatest fault of railway management.

We see funds so curtailed that needed and true economies are perforce abandoned in favor of empirical reductions in equipment, men and all working facilities. We see false economies and glaring extravagances existing cheek by jowl on the same railway. We see starvation wages and fat schedules allowed in different departments of the same railways year after year, and we see the demoralizing effects on the favored and underpaid alike. We see good workmen hampered by poor tools and poor workmen untaught in the use of good tools. We see office labor multiplied without good results. We see materials purchased without due discretion and disbursed with less.

Why should these things be? Because the employer knows far too little of the details. Until each and every officer knows the needs of the men and property under his jurisdiction, these evils cannot be wholly stamped out. It is not sufficient to stop with a knowledge of the work of one's immediate subordinates. The railway officer is most valuable who knows all the work from the ground up, not of one but of all departments. It is not impossible of achievement, this wide range of knowledge.

It is indispensable to the proper, the scientific, management of railways.

Of what value is an army of brave soldiers under ignorant officers; or of intelligent captains under a foolish general; or of a brilliant general and army, under the orders of a blundering government? The whole machinery of railway management must be of the best from the ground up to be effective. The employer must learn the details before he is fitted to understand, much less to teach, the rudiments of scientific management. "Obviously there must be one best way and one best tool for each job," says Mr. Klyce.

There are many excellent methods employed and many good tools used in railway work. But is the one best tool used and the one best way followed in the performance of each piece of work? Evidently not, for there are many different kinds of tools used for the same work and many different methods used in arriving at the same result on different railways.

Few if any railways buy the best tools. The first cost looks big. There is an ancient but ingrained idea lurking somewhere about headquarters that unskilled workmen can do as much execution with poor tools as with expensive tools. Again, we have to think of Messrs. Jones, and the Smith Company; both firms being at the same time manufacturers of tools and large shippers over our railway. Again, we must allow for the suave supply man who is ingenious in argument to convince us that we should try his superior brand of tools at less cost than those we are buying from his competitor. Also, we experiment; and, to a certain extent, rightly. Too much standardization of tools, materials or methods is deplorable. If standards are made, even scientifically, and blindly adhered to thereafter, progress is not possible. Inventions are every day occurrences in this country. Over a million of patents are of record in the patent office in Washington. Many are for devices used by railways. Standards should be decided on, put in use, and adhered to with discretion; laid aside after mature deliberation only, in favor of some later, well tested and better devices.

Excessive standardization means stagnation. Excessive and ill-advised experimenting means confusion and useless expenditure, with attendant poor results. The railways need the best tools. They are the cheapest. They need the best methods, which are likewise cheapest. Both tools and methods should be standardized and only altered in favor of some later discovered and well tried invention or scheme.

How may this ideal be attained—and maintained? Manifestly, it can best be done by some agency acting in conjunction with all, or a number of the most powerful, railway managements. "In union there is strength."

An experiment station, a bureau of investigation into these matters of vital interest to railway life, created and supported by a fund set aside by the railways, will accomplish these objects, which never have yet, and probably never will be, realized otherwise. At present, it is left to railway supply companies, and to the professors of various colleges of engineering. They have done and are doing much toward perfecting and investigating and demonstrating along different lines with different objects in view. But the railways want concentration of purpose and action; a definite policy; an institute having for its sole object the improvement of tools, materials and methods to be used in railway service; and continuous labor along this line by authorized agents of ability with the best of apparatus and experimental purposes, and commensurate emoluments. We need an Inter-Railway Institute of Technological Investigation; we need the results in printed form, for the use of railway men generally. Otherwise how is a busy official to obtain all this knowledge of the different departments? We need practical education in railway management, and we must create and carry on our own school. The United States government issues from time to time through its agricultural department, gratis or at nominal cost, circulars of high value to agriculturists and others, detailing the experiments, the results obtained and conclusions drawn

therefrom by experts in government employ at the different experiment stations. Information similarly compiled would be invaluable to the railway man generally, and could be issued from time to time by this suggested institute with railway support.

There is also at every railway officer's disposal a very simple method of increase of efficiency: the asking of questions.

No railway exists the management of which is absolutely perfect in every detail. Therefore, there is always room for improvement. This possibility is best and soonest visible to the man on the ground. He is in direct charge. He is "up against" each difficulty. He has or must find the best practical solution.

True, he occasionally is consulted by his immediate superior. But time after time, year after year, valuable suggestions by such men go begging because they fail to penetrate to the atmosphere of the headquarters' offices. Why not go after this information systematically? Call it in? No; send after it, and don't send a boy. Send men of proper discernment, and authority, and breadth of mind, and ability to separate the wheat from the chaff. Send them direct from, and let them report to, the highest authority of their road. Let them interview the men behind the guns—the switchmen and yardmasters, the local freight and passenger agents, the firemen and engineers and roundhouse foremen, the building foremen, the section foremen, the chief clerks and the assistant engineers, the train despatchers and roadmasters and trainmasters. These men know the road, they know its needs—from their points of view, and within their territorial horizon. They can tell you how to improve your facilities and your property values, and your material standards, and your tools, and how to reach your patrons and increase your net incomes. Is this not valuable information? Why then not go and get it systematically and scientifically, and sift it and tabulate it, and put it up in plain and proper form to the big boss? He should and must start the system and maintain and profit by it.

An expression common to American journalism is that "the railways are the best financial thermometers." In other words, the railways first feel and reflect the stress of hard times, the shadow of the threatened financial depression, and the railways first show the effects of money scarcity. Men and trains are laid off, construction in all branches is stopped, cars are stored, scrap heaps are scrutinized, "things tighten up." It may be a real panic, or simply a coming financial year end. The effect is the same. A showing must be made—and it is made. It is imperative, whatever the cost. There is only such judgment used as is allowed. The cut must be and is made. Is this good business? What is the necessity? In your private affairs do you not put away money for the rainy day? Would you consider yourself a good grocer if you saved nothing in a good month to tide you over a slack month? Would you stop buying strawberries in July because of poor business or hard times, when your customers were calling for them every day? Neither the extravagances nor the economies of railways are scientifically conducted, nor are normal expenditures made with all possible discernment. The average railway is far better managed than the average commercial or industrial business, the percentage of failure being far less. But there is undoubtedly room for improvement; and the methods of improvement, and field of most lucrative action, are not far to seek.

In addition to the electrification already decided on of the Kiruna-Riksgransen railway through Lapland, for which purpose a large hydro-electric power station at Porjus is being built, the Swedish state railways have now drawn up a plan for the electrification of the local traffic on the Stockholm-Marsta line and the Gothenburg-Alingsas Railway. It is proposed to take the electric power for the latter from the state power station at Trollhattan, the three-phase current to be transformed into one-phase current of convenient voltage. It is proposed to obtain the electric power for the Stockholm-Marsta line from the city of Stockholm's central station at Vartan.

AMERICAN RAILWAY ASSOCIATION.

The spring meeting of the American Railway Association was held in New York City on Wednesday of this week.

J. Kruttschnitt, director of maintenance and operation, Union and Southern Pacific Systems, was elected president. R. H. Aishton, vice-president, Chicago & North Western, was elected first vice-president for the ensuing two years. T. E. Clarke, assistant to president, Delaware, Lackawanna & Western, and H. J. Horn, vice-president, New York, New Haven & Hartford, were elected members of the executive committee. The Boston & Maine, the Hocking Valley, and the Pennsylvania Lines West were elected members of the Committee on Transportation. The Atchison, Topeka & Santa Fe, the Norfolk & Western and the Pennsylvania Lines West were elected members of the Committee on Maintenance. The Chicago & Western Indiana, the Lake Shore & Michigan Southern and the Wabash were elected members of the Committee on Relations Between Railroads. Benjamin McKeen, general manager, Vandalia; J. C. Stuart, vice-president and general manager, Erie Railroad, and G. W. Taylor, general superintendent transportation, Southern Railway, were elected members of the Committee on Nominations. The association decided to hold its next meeting in Chicago on November 20, 1912.

There were present 169 members, representing 187 railroads. The executive committee reported that the membership now comprises 348 members, operating 259,198 miles, an increase of 1,289 miles. The associate membership now comprises 116 members, operating 5,895 miles, an increase of 17 members and 676 miles. The committee reported that a number of important subjects had been considered and referred to the several committees of the association for attention. The committee also said that it has become evident that the form of accident report now made to the Interstate Commerce Commission by the railways is of such a character as to cause an unjust estimate to be drawn regarding the safety of travel in this country as compared with other countries. The committee has therefore appointed a sub-committee, consisting of the following: J. Kruttschnitt (U. P. and S. P.), chairman; H. J. Horn (N. Y. N. H. & H.), and W. W. Atterbury (Penn.). to consider the subject.

COMMITTEE ON TRANSPORTATION.

The committee on transportation presented a report in which it submitted an inquiry which had been made to it regarding practice under the Standard Code and the reply made thereto by the committee. The committee also referred to the general revision of the Standard Code, the preliminary work of which is now in progress.

COMMITTEE ON RELATIONS BETWEEN RAILROADS.

The committee on relations between railroads, Arthur Hale chairman, presented a report recommending an increase in the per diem rate for freight cars and the establishment of a commission to supervise the observance of the freight car interchange rules, this commission to have power to impose fine for unreasonable delay or diversion of cars. Referring to the opinion of the Interstate Commerce Commission in the case against the Illinois Central reported last autumn, declaring that carriers are bound to maintain through routes and furnish an adequate supply of cars, the committee says that its present recommendations afford the best means of doing away with the difficulties and abuses which have stood in the way of carrying out the view expressed by the Interstate Commerce Commission. It believes that an increase in the per diem rate will stimulate the acquisition of cars and facilities, and the proposed special commission should be able to bring about a fairer and more intelligent interchange of cars. The recommendations now offered have been discussed and largely formulated by a committee of 15 of the Association of Transportation and Car Accounting Officers, at the request of the American Railway Association committee, and it is believed that the recommen-

dations will be approved also by the Interstate Commerce Commission. The rate for interchanged freight cars at present is 30 cents per car per day in the five months, March-July, and 35 cents in the other seven months of the year. The proposition to make a uniform rate of 45 cents, was approved and referred to letter ballot; if adopted, to take effect January 1, 1913.

The proposal to establish a commission is embodied in a new per diem rule, No. 19, which is as follows:

The Executive Committee of the American Railway Association shall appoint a commission for the purpose of supervising the observance of Car Service Rules 1, 2, 3 and 4, governing the handling of freight cars.

The commission, through its duly authorized representatives, shall be empowered to examine the records of any carrier for the purpose of determining the merits of complaints filed with the commission, under the following conditions:

Any railway, after due notice to offending line of its intention to do so, may refer to the commission cases of persistent delay or apparent persistent misuse of its cars.

It shall be the duty of the commission to make, through its authorized representatives, such investigations as may in its judgment be necessary to determine facts.

Based upon the facts developed by the investigation, it shall then be within the power of the commission to impose a money fine, the minimum of which shall be \$2.00 for each violation, such fine to be paid to the car owner, and to be in addition to per diem accrued and expense incurred incident to the investigation.

In the event the case presented is not proven, the expense of the investigation shall be paid by the complainant.

The commission shall not consider a case unless presented within 90 days from date of first alleged violation, nor shall the investigation extend back of a period of 90 days from date of filing of complaint with the commission, nor prior to the adoption of these rules.

This proposition was referred to letter ballot. If approved, it will become effective July 1, 1912, except for the provisions for penalties (in the fifth and sixth paragraphs above) which will not become effective until September 1, 1912.

The Association also approved the recommendation of the committee that Per Diem Rule 3, reading as follows, be referred to the members of the association for a letter ballot; if adopted to take effect September 1, 1912:

Freight cars must be handled as prescribed by Rules 1, 2, 3 and 4 of the Code of Car Service Rules of the American Railway Association.

The committee also proposed slight changes in those four car service rules which affect the per diem rule, and in Rule 15 concerning transfer of lading. These were adopted, effective September 1, 1912.

Demurrage Rules.—This committee also recommends a number of changes in the demurrage rules, based on extended conferences with a committee of the National Industrial Traffic League held last March, and in particular at a two days' conference at Atlantic City, March 28 and 29, which was presided over by Interstate Commerce Commissioner Lane. These changes are mostly in the nature of explanations designed to prevent misunderstanding of the present rules. A number of concessions had to be made to the shippers, but some also were obtained from them. The shippers' committee asked that the railways charge demurrage on cars containing their own material; this on the ground that when cars are scarce the railways do not unload cars with the promptness which they require of their patrons; and the committee recommends that this request be granted. These changes were approved by the association, effective September 1, 1912. Standard forms of notice covering constructive placement, and also the placement of cars ordered to public-delivery siding which prove to be unavailable, as well as the term to be used in accordance with the instructions under Rule 8, Section A, were also presented by the committee and approved by the association, effective September 1, 1912.

Rule 5.—The committee again recommends the elimination of per diem rule 5. The per diem reclaim, as now practiced, sometimes looks like an illegal discrimination—a thing which must be avoided. The committee believes that adjustments of switching rates could be made, so as to abolish this rule next January without detriment to any material interest. This was

referred to letter ballot; if approved, to take effect July 1, 1913.

Cleaning Stock Cars.—The committee recommends a new rule to provide that when stock cars have to be cleaned or disinfected the cost should be prorated between the carriers participating in the waybill revenue; but where the work is done on a switching line, the payment is to be in the shape of a reclaim of not to exceed two days' per diem charges. This was approved.

Advice of Cars Sent Back.—Acting on a recommendation of the Car Accounting Officers' Association, the committee recommends a resolution that when a car is refused or sent back to a connection, a written notice, giving the reason, should be sent to the proper transportation officer of the delivering road. This resolution was approved.

Storage Rules.—The committee submits a set of storage rules, based on a study of storage rules now in effect and believed to embody the best American practice. These rules have been submitted to the members of the association and amended in accordance with criticisms received, and now are offered for adoption as recommended practice. No. 4 of these rules covers explosives, etc. For this class of goods rates are named (with a minimum of 25 cents per 100 lbs. per day after 24 hours); but the rates of ordinary merchandise are left blank. The rules in general are based on the principles of the car demurrage rates. These were approved.

Rules for Marking.—In its study of the problem of reducing losses and damage to freight, the committee has reached the conclusion that uniform rules for marking and packing freight are very desirable, and its views on the subject are set forth in a special report, prepared by a sub-committee. In this connection, the committee proposes a resolution that the railways take care to always set a good example in this matter, carefully marking company material transported on the trains. The committee also endorses a form, submitted by the sub-committee, for a standard interline astray freight waybill. All these were approved.

Statistics.—The committee presents the usual statistics of freight car equipment and persons, etc.

COMMITTEE ON MAINTENANCE.

The committee recommends that the association postpone consideration of the rail specification approved by the American Railway Engineering Association on March 20, 1912, feeling that the association will be enabled to act more intelligently after the joint committee of railway officers and rail manufacturers, appointed after the rail conference on March 21, have completed their consideration of the subject. The committee on maintenance hopes to submit a full report on the subject at the fall meeting, at which time it believes it can present the conclusions of the rail committee of the American Railway Engineering Association on the question of rail sections as well as specifications.

It is expected that at the next meeting the committee will be able to present a complete report on right of way clearances and maximum dimensions of box cars.

The committee also presented the following summary of replies to Circular No. 1156, respecting the number of freight cars, passenger cars and locomotives equipped with safety appliances as required by the United States Safety Appliance Standards:

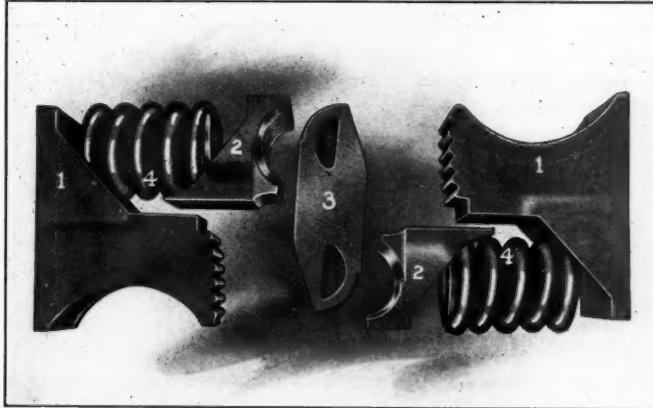
	January 1, 1912.
Number of members reporting	262
1. (a) Freight cars in service.....	1,910,940
(b) Passenger cars in service.....	44,336
(c) Locomotives in service	49,980
2. Fully equipped with safety appliances required by United States Safety Appliance Standards:	
(a) Freight cars	117,201
(b) Passenger cars	8,640
(c) Locomotives	13,600
3. Fully equipped with secure grab-irons or hand-holds on the ends and sides of each car, as required under section 4 of the Act of 1893 as amended April 1, 1896, and March 2, 1903:	
(a) Freight cars	1,909,717
(b) Passenger cars	44,262

The committee on transportation of explosives presented the revised regulations for the transportation of explosives and other dangerous articles by freight, including Shipping Container Specifications 1 to 6, inclusive, which became effective March 31, 1912, and the new regulations for the transportation of explosives and other dangerous articles, effective March 31, 1912, applying to express carriers subject to the Act to Regulate Commerce. It named the 14 express companies by whom the regulations have been issued.

The committee on electrical working presented a revised diagram covering a standard for limiting clearance lines for third rail and permanent way structures and rolling equipment, which was approved by the association. The committee also recommended specifications for overhead crossings of electric light and power lines, which were also approved by the association.

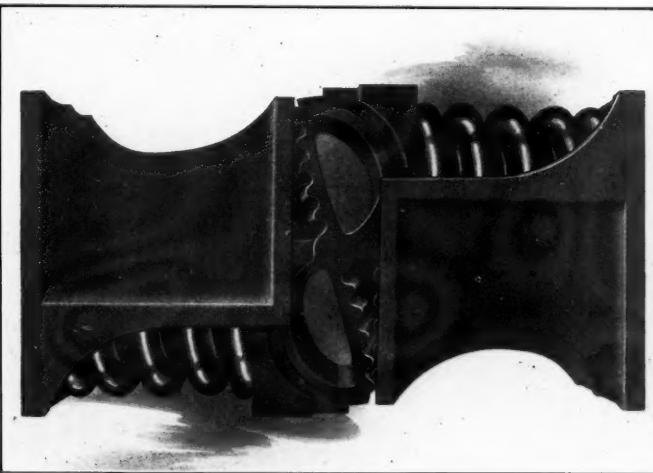
ANDERSON FRICTION DRAFT GEAR.

Friction draft gears of the type here illustrated, have been thoroughly tested by two years' service on the tenders of freight locomotives; the drawing shows a recent application to freight cars which has a greater capacity than the earlier gears. The maximum capacity under static tests is 304,000 lbs., with a $2\frac{1}{2}$ in. deflection, while the earlier gears had a travel of only



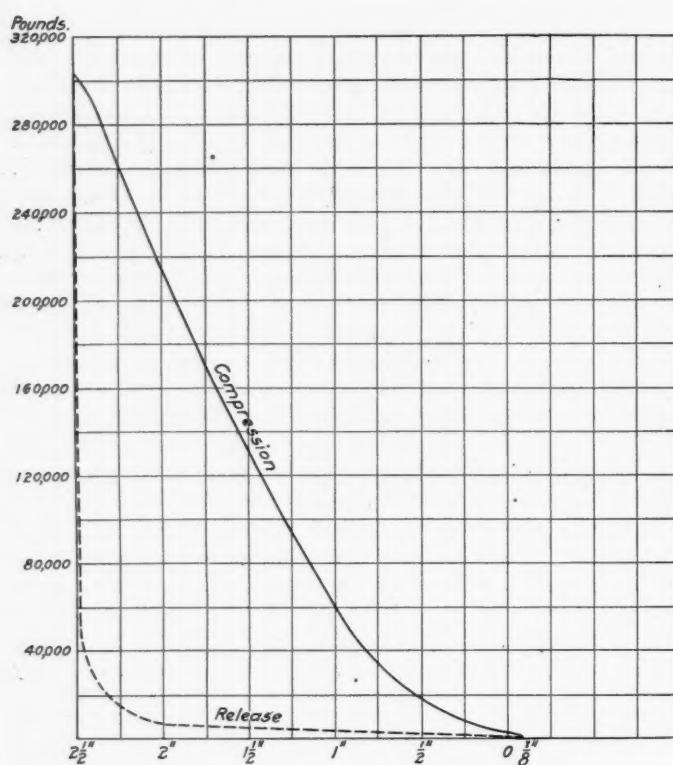
Detail Parts of Anderson Friction Draft Gear.

2 in., and a capacity of 200,000 lbs. Each of the gears consists of only five principal parts, not including the springs. These parts are made of open hearth cast steel, and are shown sepa-



Anderson Friction Draft Gear Parts Assembled.

rately in one of the illustrations. The followers 1 at each end are alike and interchangeable; so also are the spring caps 2. The lever 3 has V-shaped grooves on the circular faces, and these are the friction elements. They mesh with similar grooves



Static Test Curve of Anderson Friction Draft Gear.

in the spring caps, and these in turn are held against the lever by the draft springs.

The action of the gear is as follows: As the followers press against the lever the leverage is gradually changed, so that when the stroke is complete the leverage is as one to three against the springs. At the same time the circular portion of the lever turns in the grooves of the spring cap, which increases the resistance to the movement of the follower in the same ratio as the leverage. This resistance is greatly increased by the friction of the V grooves in the circular wearing surface. When the movement is complete the followers butt solidly against each other, thus preventing further stress in the springs and the friction elements and protecting them from breakage under heavy buffing blows. It is obvious that this gear may be adapted for a greater movement than $2\frac{1}{2}$ in., by simply changing the radius of the circular wearing surface. It is advisable, however, when a larger travel is desired to use larger springs

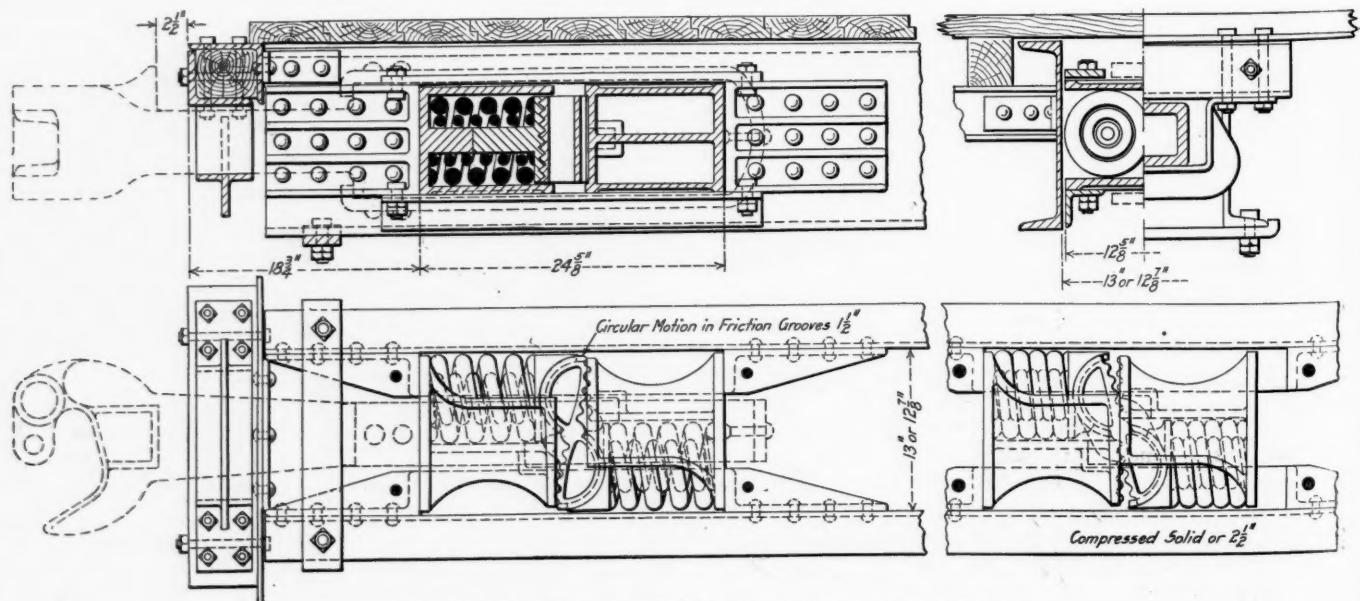
also, and a greater frictional resistance will then be obtained.

The advantages claimed for this gear are its simplicity; the weight is 30 to 40 per cent. less than that of other gears of equal capacity, and the wearing parts are interchangeable and easily assembled. The first cost is comparatively low; the expense for application is small and the cost of maintenance is low. Several advantages are also claimed for the action of the gear. Its flexibility is pronounced; that is, it has a smooth action under light as well as heavy loads; the friction resistance is continuous, and there is no sudden shock from the slipping of the wedges or the abrupt change from spring to friction resistance. The reaction is positive and the release immediate. The gear does not remain set on release, as some others do, and the free motion throughout the train enables the locomotive to start it with less tractive effort than if the gears were set rigid. The drawing shows the gear as arranged for a $9\frac{1}{8}$ in. coupler butt and the standard drawbar yoke on freight cars. It is manufactured by the Mid-Western Car Supply Company, Peoples Gas building, Chicago.

It is proposed to build a line from a point on the Burma railways, near Mogaung, in a northerly direction through the Mogaung valley past Khamaling, then through the Hukong valley to a connection with the Assam-Bengal Railway at Ledo.

A contract has been made between the Sorocabana Railway, Brazil, and the government of the state of Sao Paulo for the construction of the company's extension from Salto Grande to the port of Tibirica. The government will supply the capital for the construction on a basis of \$25,600 per mile, plus \$440,000 for the purchase of rolling stock. In addition to this the company agrees to transfer to government all its rights in the concession for the line from Sao Joao to Santos.

The concessionaires of the Ucayali Railway, Peru, have been authorized by the congress of Peru to change the gage of the line from 4 ft. 6 in. to 3 ft. 3 in., but the tunnels and cuts will be built for the wider gage. The preliminary surveys and plans of the route have almost been finished and actual construction work will soon be commenced. This railway will open up a rich region of country in eastern Peru and will place the Amazon valley in direct railway communication with the capital of the republic and the Pacific coast. The estimated cost of the line is \$10,000,000, on which the Peruvian government guarantees 6 per cent. a year secured by the income from the tobacco tax. The Ucayali Railway is also known as the Pacific Railway concession.



Application of Anderson Friction Draft Gear to Freight Car.

Maintenance of Way Section.

THE judges of the contest on the Organization of the Extra or Floating Gang which closed April 25, were L. C. Fritch, chief engineer, Chicago Great Western; L. R. Clausen, division superintendent, Chicago, Milwaukee & St. Paul, and G. H. Bremner, district engineer, Chicago, Burlington & Quincy. They awarded the first prize to A. Palmer, roadmaster, Western Pacific, Sacramento, Cal., and second prize to P. J. McAndrews, roadmaster, Chicago & North Western, Belle Plaine, Ia. Other papers were submitted by A. Swartz, division engineer, Erie, Huntington, Ind.; F. W. Lawrence, supervisor, Central of Georgia, Macon, Ga.; M. Henry, supervisor, Chicago & Eastern Illinois, Salem, Ill.; S. B. Peter, roadmaster, St. Louis & San Francisco, Pittsburg, Kan.; George Corcoran, roadmaster, Chicago & North Western, Centerville, S. D.; W. K. Walker, division engineer, Missouri, Pacific, Wichita, Kan.; M. Ganley, roadmaster, Atchison, Topeka & Santa Fe, Argentine, Kan.; J. E. Tobin, roadmaster, International & Great Northern, Houston, Texas; G. W. Roberts, roadmaster, Central of Georgia, Columbus, Ga.; Joseph J. Morgan, storekeeper, New York Central & Hudson River, Kingston, N. Y.; P. H. Hamilton, St. Louis & San Francisco, Pittsburg, Kan.; F. M. Patterson, Chicago, Burlington & Quincy, Chicago, and George J. Sharkey, New York Central & Hudson River, Kingston, N. Y. Several of these papers appear in this issue and others will be published in succeeding issues.

renewal of an old one where traffic must be maintained with little or no interruption gives rise to a large number of bridge kinks of one class. The building of a structure on a new line where it is hard to get in material or equipment, or where no attention need be paid to traffic, develops another kind. The organization and handling of the continual light maintenance repair work calls forth still a third kind. All these and any other classes of kinks having to do with bridge construction, renewal and maintenance comes within the limits of this contest. If the description is of a device, photographs or sketches should be sent if they will help to make its nature and operation clear. We will pay \$25 for the first and \$15 for the second best kinks submitted, and will pay our customary space rates for all contributions that do not win prizes, but which are accepted and published. All contributions must be in the hands of the civil engineering editor of the *Railway Age Gazette*, 417 South Dearborn street, Chicago, not later than June 25.

SO many new track devices are being developed and tried experimentally that it is worth while for railways to consider the best way to conduct such experiments and to inquire whether the greatest benefits possible are being secured from them. On many roads there is little, if any, system in testing such devices. An engineer maintenance of way or a division superintendent sees one which he believes has merit, and arranges with the inventor or promoter to test it out in his track. Another officer of similar rank does likewise with a similar, or not infrequently the same, device on his territory. Little information regarding the results is exchanged, and they are therefore known only locally. On some roads, however, including the Pennsylvania and Union Pacific, such experiments are concentrated at a few points under the supervision of a definite group of men. The Pennsylvania Lines West have a section of test track near Wooster, Ohio, and the Pennsylvania Railroad has a similar test track near Tyrone, Pa., where several miles are laid with various kinds of ties, joints, rail anchors, etc. The different devices are in service under the same traffic and climatic conditions and maintained by the same track forces. The advantages of grouping experiments are several. Inspection by the supervising officers is greatly simplified, and they are enabled to keep more closely in touch with all developments than if they had to make trips to see how each particular joint or tieplate is working out. Again, direct comparisons may be made between different devices of the same general nature which are in use under the same conditions. By concentrating the experiments at a few points it is possible to see that roadmasters or supervisors, as well as section foremen, are placed in charge of the track selected for experimental purposes who are in sympathy with the tests and will watch them closely. Cases are not unknown where devices have been unfavorably reported on because of lack of interest or close attention on the part of the track foreman in charge. It frequently happens that by close observation of the actions of any device in service important modifications may be suggested which greatly improve it. It is fully as much to the interest of the railway as to the inventor or promoter that any device based upon practical ideas be given a fair trial, for if possessing advantages over devices in present use the economy resulting accrues to the benefit of the railway. The railways are very willing to test out any device which appears to have merit, and with the number of them being continually developed at the present time it is advisable to consider whether tests are being conducted in a way to secure the greatest amount of information with the least trouble to supervising officers.

IN view of the difficulty encountered in securing work train crews experienced in the unloading of track material many roadmasters are finding it necessary to place a foreman or experienced trackman in charge of such labor. With the agreements existing at present with labor organizations on many roads it is difficult to select the trainmen most experienced, for the rules provide that when a train is to be out for some time it must be bulletined and the oldest man in service who applies gets the train, while if the train is needed for only a few days the first crew out on the call board is assigned to it. Careless or improper unloading of material so often results in serious delays or loss of material that it is necessary to take precautions to reduce this to a minimum. The unloading of rails without proper regard to the exact place where they are to be put in track results in serious delay to the steel gangs, especially if the rails have to be carried some distance. Likewise the uneven unloading of ballast results in waste or requires much trucking back and forth. Any attempt on the part of the roadmaster to get the train crew to take care is likely to fail, for, as they are subject to the trainmaster, he cannot enforce discipline over them. For this reason he is often warranted in having the train crew assigned to work under some foreman who realizes the importance of this work and whom he can hold responsible.

WITH the bridge work for 1912 well organized and under way, the contest on Bridge Kinks will appear timely to those connected with this class of work. Bridge work differs from track work in that each job is a problem in itself and the opportunity for ingenuity is greater. Also, because of the higher class of labor employed improved ideas can be more successfully carried out. Many little devices and methods worked out to meet conditions at one point could also be adopted at other points to good advantage. While the saving in overtime, labor or material may be small individually, the total amount is large, and their development should be encouraged. The problems met by bridge men differ so widely that a wide variety of kinks is possible. The construction of a new bridge or the

ORGANIZATION FOR EXTRA GANGS.

THREE is no work under the supervision of the roadmaster or track supervisor which offers greater opportunity for the display of ability than the economical handling of extra gang work. The money expended is large in proportion to that spent by the regular forces. One western road now has 135 extra gangs working, each of which probably averages 50 men. The papers received in the contest on the Organization of the Extra Gang, which are published elsewhere in this issue, contain many practical ideas of men who from their direct contact with the work realize its importance and are giving the subject careful thought.

With the rapid change taking place in the character of the forces making up the extra gangs, the methods of organization of ten years ago have become inapplicable, but one still finds many gangs handled under the old methods with a resulting loss in efficiency. Roadmasters who have studied conditions and revised their methods to meet these changed conditions are making the least complaint about the quality of present labor, for, while the labor is not what could be desired, in many cases the man who complains is not getting from it all that he can. Its quality will probably not improve, and the problem facing the roadmaster is to so arrange his forces as to get the best results from the labor available.

The first and most important requisite for efficient extra gang work is a good foreman. A man who makes a good section foreman in charge of five or six men will not necessarily be a success when placed in charge of 50 to 75. If possible, the foreman should be selected from those who have been assistant foremen in extra gangs previously and are familiar with the work. An interesting difference of opinion is expressed in the papers regarding the advisability of placing section foremen in charge of extra gangs; and each side has good arguments. The rate of pay of the extra gang foreman is usually \$15 to \$20 higher than that of the section foreman, and, therefore, the placing of the section foreman in charge of an extra gang is a promotion. It also undoubtedly instills a better spirit among the section foremen to know that these better paying positions will be filled from among their own number. On the other hand, the taking of the regular foreman away from his section during his working season, which is short enough at best, undoubtedly tends to disorganize the regular section force to the detriment of its work. The substitute foreman will, in most cases, not be as capable as the regular foreman, and knowing that he is in charge temporarily will not take as much interest in the work. Also, the foreman who regularly spends his summers on extra gang work is very often inclined to look upon his section as a makeshift to carry him through the winter, and he, accordingly, does not take the proper interest in it.

Having selected the foreman he should be given enough assistants for proper supervision of the men. The number of laborers one man can handle efficiently varies both with the class of labor employed and the kind of work being done. In work such as relaying rail, where the men are strung out and each has his individual duty to perform, the amount of his supervision required differs from that where a gang is bunched and all are doing the same thing. With foreign laborers increased supervision is necessary to instruct the men properly and prevent them from being injured. In most cases gangs have too few rather than too many assistants. The foreman should, if possible, be experienced in handling the class of men used as well as in the work to be done. A foreman who can use the southern negro to advantage will not necessarily be able to handle an Italian gang. The interpreter in foreign gangs is usually a cause of trouble and his control of the men is such that many foremen prefer to do without an interpreter rather than contend with his interference.

Although many times the kind of labor used is governed by the supply available, it frequently happens that men can be selected for their adaptability to the work to be done. The hobo and Austrian are generally recognized as better men for

rail-laying gangs than the southern European laborer, because of their greater size, while the reverse is true for ballasting. It is advisable not to collect too many gangs of one nationality in one vicinity because of the greater danger of their acting in unison in a strike or disturbance. In building a new yard on the Baltimore & Ohio at Chicago Junction, Ohio, a year ago the general foreman hired his men so that he had but one gang of any one nationality in the yard, and he had very little trouble with the men. Some foremen prefer to mix the men in their gangs in the same way.

The importance of providing good food as a means of holding the men is not as generally realized by the railways as by contractors. Many contractors are able to maintain full forces at almost any season because of their reputation among the laborers for providing good board. Because of the size of railway organizations it has been considered advisable in many instances to contract for the boarding of the gangs, with the result that the company loses direct oversight and control of the quality of the food provided. A good boarding camp is a very strong advantage to a foreman in holding his men, for they will many times remain where they are given good board and lodging, even if not satisfied with other conditions.

The elimination of lost motion is to be desired at all times, but especially so in the case of a gang of 50 to 75 men where the labor charge per hour is high. The moving of gangs from one place to another can be carefully planned so that no unnecessary movement will be made, and the moving should be done at a time when it will interfere with their work as little as possible. One source of frequent delay, especially to gangs laying rail, is the necessity of waiting for material or tools. The foreman should be provided with a complete set of tools when the gang is organized, and an ample supply in good condition should be maintained. Likewise, the track material should be provided well in advance of the work. The roadmaster should see that the storehouse is advised of the date material will be needed and should keep a close check to know that it is on hand before sending the gang to any point. In the securing of material, the roadmaster is very largely dependent on the co-operation of the store department, which can see that orders are shipped complete and on the date requested. The frequent experience of a foreman starting to put in a switch, for instance, and finding some essential part missing, is not conducive to good work. Failure to receive the proper supplies at any point not only discourages the foreman, but if he is obliged to lay off his gang for a day or so, his organization will be rapidly broken up.

The question as to the proper dividing line between section and extra gang work is a subject of considerable controversy among track men, and the results secured by either method depend largely on the local conditions and the methods of the individual roadmaster. It is generally granted that all rail renewal and ballasting work should be done by extra gangs, although in ballasting the best results are sometimes obtained by giving the section foreman additional men and allowing him to make the final raise and surface, as he will do the work more thoroughly when he knows he will have to pick up any low joints after the gang leaves. For the same reason it is generally considered advisable for the section foreman to renew all ties unless the track will be ballasted the same season, at which time the ties are renewed in connection with the ballasting. When the ordinary tie renewals are made with an extra gang the tamping is apt to be done unevenly, and the section gang will have to follow very closely after. When comparatively heavy work is done with a large section force the foreman should be provided with an assistant so that if it is necessary for him to make small repairs at some other point the gang will not be idle until he returns.

These and many other details essential to a successful organization of extra gang work must be planned and anticipated in advance of the work, and the roadmaster who most carefully considers them will secure the best results.

THE ORGANIZATION OF THE EXTRA GANG.

Contributions Received in the Prize Contest, Discussing
Methods of Successfully Handling Heavy Maintenance Work.

FIRST PRIZE—ORGANIZING AND HANDLING AN EXTRA GANG.

BY A. PALMER,

Roadmaster, Western Pacific, Sacramento, Cal.

In the West it is the practice to ballast, relay rails, build new sidings, clean cuts, etc., with extra gangs. I believe this is the most economical method, as these gangs can be assigned to one class of work and kept constantly at it. If a regular section force of six men is increased to 25 for a job of ballasting, for instance, it is uneconomical in several ways. Every day there is something coming up that takes the time of from one to six men, and if the foreman is handling foreign labor, as is almost always the case, he cannot send these men to do this work, but must go in person and show them what is to be done. If an extra gang is doing the ballasting, and the section gang is attending to its regular duties, both classes of work are receiving proper supervision.

It is often more profitable on small jobs, such as building short spurs, or temporary track a few hundred feet long for contractor's use, to combine two section gangs, instead of taking an extra gang from an assigned job, and moving them possibly 30 or 40 miles during working hours. The extra gang might do the work in one day, while the combined section gangs would consume four days, but the extra gang would consume the greater part of three days in moving to, doing the work and returning to their regular assigned job. As the men are paid while moving during working hours, the cost is excessive. Errors of this kind are often charged against the record of an extra gang foreman and his gang, when it is really the lack of foresight or judgment on the part of someone higher in authority. A foreman is given credit according to the cost of the job, not according to the labor actually spent upon it, and the cost of transportation is not usually figured in the estimate.

A roadmaster usually has several first-class section foremen from whom he can select extra gang foremen. To change a foreman from a section to an extra gang should be considered a promotion, and recommendations for the position of roadmaster can be made from the extra gang foremen, according to ability shown, not as to personal likes and dislikes, as is often the case. If section foremen are used in extra gangs it should not tend to demoralize or break up the section organization. There is hardly a time when a section foreman is promoted to an extra gang, but that the roadmaster has a foreman ready to take charge of the section. The promotion of a section foreman should not disrupt the organization any more than the promotion of a supervisor to roadmaster or an assistant superintendent to superintendent.

A foreman need not necessarily be selected because of his experience with the class of labor handled. He should be a man of good judgment, familiar with the methods he intends to employ, and a close student of the characteristics of different classes of labor. He should have force of character enough to uphold his opinion and give his men the impression that he thoroughly understands what he is doing. When a new gang is organized, the first day is usually a try-out between the foreman and the men. The gang is usually composed of men who have had some experience in the class of work they are about to engage in. If he has confidence in his own ability, the foreman will start in as if he had just moved from one portion of the work to another. The gang will have confidence in him at once and results will be shown from the first day.

Assistant foremen and timekeepers should be selected by the foreman, and he should have the power to hire and discharge them without interference. His decision should be supreme as far as the organization and discipline of his gang is concerned.

Roadmasters and other officials should judge him only by results obtained. The roadmaster should examine his requisition for tools, etc., and talk over such requisitions with him on the ground. Tools should be forwarded at once, so the gang will not have to work with inadequate tools for several weeks while the requisition is passing from one department to another. If the requisition is reduced the gang is hindered in making the progress it should, and the foreman is discredited on account of the slow progress of the work, while in reality the fault is not his at all.

I believe that a foreman should be furnished with a copy of all estimates of the cost of the work he is in charge of. To illustrate the advantage to the foreman of having such information, I wish to quote an instance that came to my attention several years ago. A foreman, who was given charge of a ballasting gang was not instructed as to costs, and was found to be approximately \$2,000 above the estimate when the work was half completed. A change of foreman was considered necessary at once. The new man was a "method and cost" man, that is, he kept an account of every piece of work he was engaged upon and knew at the end of each day the cost per foot per man. The division engineer gave him the estimates of cost of the work, and told the roadmaster to give him full charge of the work. He found that train crews had been dumping the gravel anywhere that suited their convenience, so as to get rid of it as soon as possible and "get in." He put a stop to that at once, by asking to have the work train conductor report to him and not unload any gravel except under his personal supervision.

The foreman made an estimate of the amount needed between each engineering station, and unloaded the gravel as nearly as possible to conform with this estimate. Such methods resulted in a saving of \$1,200 on the whole job, or \$3,200 on the last half.

As to the peculiarities and relative advantages of different kinds of labor for the different classes of work, I would say, there is little to choose between them. Our forces consist of Greeks, Japanese, Mexicans and Hindus. Greek labor is most prevalent. The Greek is the stronger; but, as a general rule is lacking in ambition. The larger and stronger he is, the more apt he is to try to shift the burden of the work on to the shoulders of his smaller and weaker brother. The worst trouble we have in these gangs is when an interpreter is engaged. These men instruct the gang to take no orders from the foremen, except through the interpreter, and the gang is usually employed through an agent of the same nationality, who tells them if the foreman does not treat them right to let him know, and he will get a change of foremen for the gang. A Greek's idea of right treatment from a foreman is for him to be afraid of them, or allow them to use their own judgment as to the amount of work they should accomplish. A foreman who is getting good results, as a rule, has complaints made against him constantly. On other roads in this vicinity foremen have been told that if they could not work their gangs without so many complaints their services would be dispensed with. In the last year or so foremen are refusing to use interpreters in their gangs. Their troubles are minimized, and greater efficiency is apparent. The Greeks do not average any better than the other races, but are more numerous. The Japanese are more easily handled than any of the other races. They are more intelligent and more observant. While they are not as strong as the Greeks they are more active and will accomplish as much per man. They are very sensitive. A kind word from their foreman means increased energy on their part. They are always trying to please their foreman, and if he shows that he appreciates their endeavors, there is no doubt as to results. The Mexican must be

constantly watched as he is inclined to shirk his work, but under the charge of an alert foreman will "show up" equally with the other races. The Hindu is a new proposition, but as yet their work has not been as satisfactory as that of the other races.

SECOND PRIZE—ORGANIZING LARGE EXTRA GANGS.

BY J. P. M'ANDREWS,

Roadmaster, Chicago & North Western, Belle Plaine, Ia.

The organization of extra gangs for applying new ballast, laying rail and other extensive improvements needs to be given thorough study before starting the work and efficient supervision during the progress of it. The work should be planned with a view to distributing material by the use of the minimum train service, division operating officials going carefully into this phase of the matter and supplying the most suitable power and equipment for the work. The use of extra gangs or so-called floating gangs for the work of ordinary tie renewals and track surfacing ought to be avoided and sufficient labor furnished instead to the section foreman to enable him to keep his section up to the standard.

It is not advisable to use regular section foremen in charge of extra gangs for the reason that the maintenance of the sections placed in charge of a temporary foreman is usually unsatisfactory. On railway systems having lines in both southern and northern latitudes extra gangs and foremen should be specially employed for that work and moved to the various divisions at suitable seasons. On lines running east and west in the northern latitudes, it is necessary to do the extra gang work on the different divisions at practically the same dates, the only opportunity to shift foremen and gangs from one division to another coming through probable variation in dates of the greatest rush of traffic. To this extent, foremen and entire gangs may profitably be transferred so as to perform the heavy work at a time when traffic is lightest.

On our line the general practice is to use regular section foremen as extra gang foremen, but we avoid taking them from large yards or specially important sections. A successful extra gang foreman, in addition to being an experienced trackman must possess the qualifications of patience, good judgment and even temper. The number of assistant foremen allowed each gang depends on the nature of the work, and the number of men employed, but in all cases sufficient supervision must be given to secure the best results in quality and quantity, as well as to reduce the chance for accidents, which often result from lack of close supervision. A gang of more than 30 laborers should be allowed one assistant foreman, gangs above 50 and up to 70 laborers, two assistants, and for larger gangs an assistant for each 25 or 30 laborers. Timekeepers ought to be employed with all extra gangs and such timekeepers must be competent to render all necessary reports covering material as well as labor. Good salaries must be paid foremen and timekeepers to command the services of the best trackmen.

For ballasting, I use one foreman, an assistant to watch the tamping, and in case it is necessary to remove old ballast or widen embankments ahead of the new ballast, I use another assistant in charge of the portion of the gang doing that work. It is sometimes necessary to use an assistant foreman to raise the track, but this frequently can be done by using a competent laborer and allowing him an increase in the daily rate over the other men.

For steel laying I prefer a separate gang to distribute the new material and attend to the loading of old material. This gang should be of a suitable size to handle new rails properly and wherever practicable, new rails should be loaded in cars that will permit of unloading with air hoist or steam power. When heavy rail sections are being taken up, it is necessary to use air or steam power to load the old rails. I find it advantageous to use a separate gang for the loading and unloading, allowing this gang a foreman and a timekeeper, the principal duty of the latter being to keep correct accounts and render

reports of the receipt and shipment of material. The size of the laying gang, should be proportioned to the weight of rail and traffic conditions under which the work is being done. A good steel gang consisting of foreman, two assistant foremen, a timekeeper and 75 men will be found sufficient to lay the steel and attend to spacing of joint ties promptly after laying. One assistant foreman should be in charge of the jointing and gaging gang, while the second assistant could aid the foreman in handling the relaying gang.

The laborers for the different kinds of work should be selected with care. For steel laying the so-called hobo laborer gives fair satisfaction, and but for their propensity to "float" could not be excelled for that work. Where there is a large amount of work to be done in a limited time the hobo gangs are rather uncertain, and the writer believes a gang of Austrians to be better for such work. Our Austrian labor includes the natives of Montenegro and Bulgaria, all of whom are good steel gang laborers. Next to these, in efficiency, are the Greeks, and the same standards will be found to apply to ballasting work. Care must be taken to have competent English speaking flagmen.

A first class outfit of tools and hand cars must be furnished all extra gangs, and the tools taken care of and kept in good repair at all times. I would recommend the use of motor cars for transportation of men to and from work, and in order that the cars might be kept in good working condition, a man should be employed specially for that purpose in large gangs. Good living cars must be furnished for the laborers, and suitable office and living cars for the foremen and timekeepers. Particular attention should always be given the sanitary condition at camps, closets being provided that may be readily moved as the work progresses and the camp is advanced. A great deal of the criticism from people living near railways, is due to the primitive sanitary conditions allowed to exist. A plentiful supply of good water is a requisite at every such camp. Camps should be moved frequently so that gangs will not be required to run any considerable distance to and from work. The time spent in constructing a light spur track to hold the bunk cars amounts to little compared to the time lost by a large gang in pumping hand cars any distance. For spurring bunk cars off from main line, we use rails and points, so arranged that the main track need not be disconnected or disturbed in any way.

Where camps are placed any great distance from the station, a means of communication should be provided from the train despatcher's office to the foreman's office car. This will not only enable the foreman to send his reports promptly and get instructions from his superiors, but in case of emergency the despatcher may call the foreman and his gang. This connection can easily be arranged when the telephone despatching system is in use, and in steel laying, a portable telephone set should be furnished the timekeeper, so he may keep in touch with train movements and avoid delay both to the trains and to the gang. Where telephones are not in use, it will be found economical to provide the steel laying gang with a portable telegraph set, and have an operator accompany the gang to keep the foreman posted.

NEGRO LABOR FOR EXTRA GANGS.

BY F. E. LAWRENCE,

Supervisor, Central of Georgia, Macon, Ga.

Extra gangs necessarily differ considerably in different sections of the country and on different roads, both in the character of the laborers of which the gang is made up and in the nature of work performed. In the "black belt" of the South only negro labor is obtainable and the methods of work and organization outlined below apply only to this class of labor.

The climate is such that extra gangs are carried throughout the year and they are used principally for ditching, building side-tracks and cinders on branch lines. As a rule extra gangs are

not used for applying ties, except when spotting new ties in connection with ballasting of rail laying. Each section gang retains the same number of men the year around and the surfacing, lining and applying of ties are left to the section forces. Of course the heaviest part of such work is done in the summer, but it is carried along to a limited extent in winter as well.

The make-up of extra gangs naturally differs according to the character of the work, but there are certain fundamental features to be observed. On this road the foreman is picked from the likely section foremen, young unmarried men who are ambitious to advance being preferred. A foreman should be young so that he can be trained in the methods of his superior officers with an open mind. His former track experience on a section had acquainted him with the details of track work, but he must learn to work on a larger scale and to handle larger gangs of men economically. It is preferred that he be unmarried for his camp cars are then his home and he has no inducements to carry him away from his gang. He is thus able at all times to control his men and this is important with negro labor. To successfully work negro labor a man is required who is strict to severeness, yet who will take the part of his men when they get into trouble and settle their disputes. When the foreman starts to organize his gang he picks out a leader, or for a rail gang two leaders, one for each end of the rail. The leader is always gifted with a good voice that he uses to advantage and his function is to "deal" for the remainder of the gang. When lining track he uses a chant peculiar to that work and at the right time every man comes up on his bar in an effective manner. An effort is made to do everything possible in unison. For instance, when a number of men are doing pick work together, every pick rises and falls at the same instant in time with the rhythm of the song of the leader and it is surprising to note the speed with which work can be done by this means.

It cannot be said that the negro laborer is more naturally adapted to one class of labor than another, for the results obtained from such labor are simply an indication of the effectiveness of the foreman. The quality of labor in the South has been nearly stationary, for the negro laborer is about the same as he was immediately after the civil war. He needs a master as much now as he did when he was a slave. The increase in the cost of work has been caused mainly by the great advance in the price of labor and not to a decline in its quality.

HOW EXTRA MAINTENANCE WORK SHOULD BE HANDLED.

BY A. SWARTZ,

Division Engineer, Erie, Huntington, Ind.

The heavy work in the maintenance of way department may be done either by extra gangs or by increased section forces. It is safe to say, however, that the extra gang is most commonly used, and as the increasing of section forces is practically an impossibility on account of the scarcity of American track laborers, and the difficulty in securing efficient foreign laborers in small squads, as required for a section gang it is really the only solution for the heavy work problem. It is a well known fact that to lay new rail or to apply new ballast economically requires a gang of at least 30 men, and a gang of this size cannot be called anything but an extra gang since 15 men is about all any track foreman can handle economically. The writer is an advocate of the extra gang on account of the above conditions.

A regular section foreman is the proper head of an extra gang as he is familiar with the requirements and methods of the road. He should be given an American assistant as well as an interpreter of the same nationality as the men. An interpreter is a necessity, otherwise a good many of the men feign ignorance of the foreman's wishes. The foreman should be of even temperament, and should have worked foreigners on his section so he will know more about their peculiarities. A man who has never worked foreigners has not the necessary patience and is apt to make a failure of the work because of his lack of sympathy for their

inexperience. Timekeepers should be selected from the supervisor's clerks or from the engineering department. When extra gang work takes away the regular section foreman, the first man on the section should be given the foreman's position and salary, under which plan there should be no disorganization of the regular section force. When double tracking or reballasting is being carried on over an entire division in one season, however, more extra gang foremen may be required than there are available regular foremen, in which case outside foremen must be obtained.

A supervisor should attempt to have stronger men on the ballast gang than on the rail gang and keep them at this class of work as long as possible. The occasion for extra gang work generally arises so quickly, however, that a supervisor is willing to take any class of men he can get in any size gang. The writer has seen gangs that apparently were no good for ballasting do very well at laying rail. I have also seen a gang doing poor work under a foreman who had a good reputation that would do much better work when placed under another foreman. So the supervisor can hardly apply any theoretical or hard and fast rules, but must of necessity handle each season's work according to circumstances. If he is fortunate enough to be employed by a road that does work each year, he is able to obtain the same gangs year after year, which allows him to select his men to a certain extent, and thus apply certain theories as to carrying out his work. If, on the other hand, he is employed by a road that has no regular program of extra work, he must be content to take labor that is left after other roads have had their pick.

Foreign laborers have many peculiarities. In general, it may be said that the Italian is usually very quarrelsome, ill fed, and not very strong, although the writer has seen some very good Italian gangs. The Greeks are usually better fed and more quiet, doing more efficient work. The Teutons, including Hungarians, Bulgarians, Slavs and Poles, are much the best, as they live well and are peaceable, in consequence of which the best work is obtained from them. The writer has had no experience with Mexicans or Japanese. Negroes make very good extra gang laborers, provided the foremen are not prejudiced, for they live well, are happy-go-lucky, can stand the heat, and above all, can talk English. Hobo gangs are of no use whatever, for they are lazy and stick to the work only long enough to get a new pair of shoes and enough to buy a quart of booze. The ideal extra gang would be composed of farmer boys and men from small villages. Pay them say \$2.25 per day, furnish them good cars in which to live, contract with some reliable party to board them with good substantial food, and you have ideal conditions. Anyone must admit that the average American will do at least half at much again as foreigners, and it is the opinion of the writer that railways would save money by using American laborers at the higher rate of pay, for they could cut down the size of the gangs and still get a greater quantity of more efficient work.

OUR EXTRA GANGS.

BY W. K. WALKER,

Division Engineer, Missouri Pacific, Wichita, Kan.

The supply of extra and floating gangs for summer work is fast becoming a subject which is requiring close study. The time when all the railway officer had to do to organize an extra gang, was to select the foreman and let him organize the gang, is past. It is now up to the officer in charge of the division or district to secure the men, usually through some labor agency.

Foreign laborers on whom we must depend for our extra gangs are widely different in their mode of living and work. The division officer must give this close study and secure the class of labor according to the work in hand. Different sections of the country have different kinds of labor. In the north and east, you will find the Bulgarian, Slavs, Greek, Italian, etc.—in the west Japs, Mexicans, Greeks, etc.—southwest, Mexicans—south, negroes. Some foreigners are better adapted to heavy work; such as rail laying, etc., while others are no good on this class of work. We have foremen who can handle one nationality with the very best

results, while if he is given charge of some other nationality, he falls down completely. We work negroes, Mexicans, Greeks and Italians. I have foremen who can speak the language of these foreigners, having learned it from working with them from year to year. When a division officer has familiarized himself with the peculiarities of the classes of labor he usually has under his jurisdiction, the first thing for him to do when work opens up in the spring, is to classify the work and get in orders for the different classes of labor according to the work at hand. Then he must select his foremen for the different classes of men. These extra gang foremen are selected from section foremen. In this section of the country we have about seven months in each year in which extra gangs are used. The foremen handling these gangs are given sections for the remaining five months. In this way we use the same extra gang foremen from year to year. The promoting of section foremen to the position of extra gang foremen gives these men something to look forward to and helps to hold good foremen on the division.

It is important to consider the size of the extra gang. We must organize our gangs so as to have no lost motion. The day of large gangs of 100 to 150 men is fast disappearing. These gangs should be divided up into small gangs of 15 to 40 men each, giving them plenty and efficient supervision. Usually gangs of under 30 men can be handled by one foreman, while with 30 men or more each foreman should have an assistant. As a rule you can do twice as much work with 150 men divided into small gangs, as with them all in one large gang.

Before the gang arrives at the point desired all camp equipment, tools, etc., should be on the ground and the foreman, assistant foreman, and timekeeper should be there in charge, ready to start the work. Nothing tends to break up a gang as much as loafing. It is easy to weed out the drones and fill the places with workers. With proper selection of men and foremen and the gang properly sized we can soon make each dollar do the work of two, as compared with the old method of handling work of extra gangs through the summer season.

ECONOMICAL SIZE OF EXTRA GANGS.

BY S. B. PETER,

Roadmaster, St. Louis & San Francisco, Pittsburg, Kan.

A few years ago it was possible to procure men that could be handled in large gangs to good advantage, but the past two or three years the class of labor usually employed in extra or floating gangs is of the poorest class. I have seen a gang of 40 Mexicans work for a week and not accomplish as much as a gang of 10 Americans did in the same time. I have watched the gang of 40 for one-half hour to try to estimate the time actually put in at work by the gang, and have rarely seen more than 50 per cent. of them working at one time, and the ones who were working were only making a pretense and were accomplishing very little. I have found that better results can be accomplished with the same class of labor by employing small gangs, and where large gangs are absolutely necessary consolidating several gangs under the supervision of a general foreman, each foreman keeping the men of his individual gang together, and the general foreman being responsible for part of work assigned to each foreman. In this manner most of the men can be kept at work; while it is impossible for a foreman with one assistant to keep a gang of more than 25 men working steadily.

I would under no circumstances employ more than 35 men in one gang, and could then accomplish much better results by having two assistant foremen. I would only employ a gang of this size for rail laying. For surfacing, renewing ties, putting on plates, and in fact all kinds of work except laying rail, the small gang will do the work for much less money than the large gang.

In selecting foremen, by all means give the section foremen an opportunity to handle the extra gangs.

EXTRA GANG PROBLEMS.

BY JOSEPH J. MORGAN,

New York Central & Hudson River, Kingston, N. Y.

After an extra gang has been assembled, considerable time is nearly always lost for the first few days, especially in the case of rail gangs, and it is usually two or three days before operations progress smoothly. A considerable portion of this delay is due to comparatively small items being overlooked in the equipment and supplies for the gangs. Often an entire gang is held up on account of certain tools being overlooked. I would suggest as a remedy for a considerable portion of the delay, that a motor car be kept on the ground for the first few days to handle such emergencies. If impossible to do this, have one or two of the most reliable men assigned to the work of securing the articles needed, the quickest way in most cases being the passenger train. Particular care should be taken to send intelligent men who will understand just what is wanted, so as to do away with the necessity of making a second trip.

After everything is progressing smoothly, rainy days sometimes cause the men to lose time, thereby reducing their pay. This naturally discourages the ordinary laborer, and gives him the desire to seek employment where he would be sheltered and where the weather would not interfere with his income. One remedy for this is to have a supply of combination waterproof suits furnished, numbered consecutively so that they could be checked up, and to be used by the men only when working. When it is necessary to stop work on account of a severe storm, breaking up part of a day, the gang should be allowed to work as long as possible overtime, in order to make up for the lost time, which would tend to lessen the cause for discouragement.

ECONOMY IN HANDLING EXTRA AND FLOATING GANGS.

BY GEORGE CORCORAN,

Roadmaster, Chicago & North Western, Centerville, S. D.

On account of the continued decline in the quality of laborers furnished for extra gangs, I would recommend the following choice in selecting laborers, none but experienced men being used for laying rail, applying stone or gravel ballast and re-laying yards and switches: First choice, American track laborers (usually consisting of Irish, Germans, Scandinavians and natives of other countries of Northern Europe); second, Bulgarians; third, Austrians; fourth, Italians; fifth, Greeks. When inexperienced laborers are employed in large gangs, the foreman in charge cannot supervise the work closely enough to obtain good work, and the usual result when surfacing track for instance is that one cluster of men will tamp their rail in good shape and the men tamping the next rail will not do such good work, causing the track to settle unevenly after it has been under traffic and causing large expense to re-surface. When inexperienced men are employed, there should be two men to supervise the tamping and instruct the men how to tamp and one foreman with the raising gang; the same also applying to the work of laying rail. This is necessary in order to get perfect gage and have the spikes properly driven. When working inexperienced men, it is discouraging to foremen to try to teach some laborers the proper way to drive spikes. Frequently foreign laborers are picked up that are small in stature, and have never performed any manual labor. They have no interest in the work other than to receive their pay and that are physically unfit to do track work on account of the small quantity of food on which they subsist, in some cases living on 10 cents per day. Men of this class are the most inefficient and expensive laborers that can be employed for track work. Foremen in charge of work should be taught to more fully realize the importance of doing work well rather than trying to make records or showing that he is keeping up with previous records made by men years ago, when a better class of laborers was employed.

For floating gangs, experienced laborers should be furnished, whenever possible, in the same order as for extra gangs, and each gang should consist of from 10 to 20 men, not more than 20 when such gangs are expected to help out on sections doing general repair work. There should be an assistant foreman with all gangs of from 10 to 20 men, and two foremen for gangs of from 20 to 30 men. By following this practice we would also be educating more foremen and helping to overcome the continued shortage of foremen. Unless some change is made in the present way of supplying laborers, the now apparent dearth of foremen will increase from year to year. A first-class section foreman makes the best extra gang foreman, if it is possible to secure such men.

The moving of floating gangs from one section to another where each section foreman has charge of the gang while it is on his territory should not be permitted. Each foreman has a different way of doing the same kind of work and has a different attitude toward the men, which will eventually cause friction with the gang under numerous changes. The man in charge of a crew at the start should handle them during the season.

Careful consideration of the conditions under which our work is now carried on discloses the fact that quality in laborers employed is of vital importance. After that, complete co-operation and intelligent supervision is important and will result in the economy striven for.

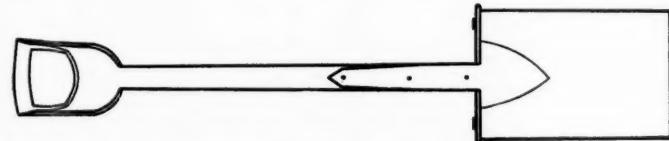
HANDLING STONE BALLAST.

BY A. M. CLOUGH,

Supervisor, New York Central Lines, Batavia, N. Y.

When making a raise of from 10 to 12 in. with stone ballast, the most common method is to unload enough stone for half this raise, put it under the track and tamp it, then repeat the operation. In this way a large amount of work is expended for the results secured. During the past two years another method has been tried on one division of the New York Central in which the entire raise is made in one operation and with excellent results.

With this method about 2,000 to 2,200 yds. of ballast per mile or enough to raise the track about 10 in. is placed at one operation. The track is prepared as formerly by digging out



Tamping Shovel for Rock Ballast.

the old ballast, renewing any ties necessary, gaging the track and driving down the spikes so that every tie is held tight to the rail. The track is filled in level with the top of the ties, or just sufficient to hold it in line, from 1 to 1½ miles of track being thus prepared ahead of the ballast. The amount of track which the quantity of stone furnished each day will lift to the full height is figured, and the stone is unloaded by doubling, or trebling if necessary, over this length of track. The stone is dumped from Hart convertible cars between the rails of the track to be raised and plowed out with a Rodgers ballast spreader. This amount of track, varying from 2,400 to 3,000 ft., is finished each day for trains at full speed with a gang of 50 men, with one foreman and two assistant foremen.

To do this work the men are distributed as follows: Two men dig holes for the track jacks; 13 men handle the jacks and tamp the joint and center ties; 24 men fill in and tamp the ends of the ties; 8 men line track; two flag trains and one carries water. Two jacks are used on each side and both rails are lifted at the same time. The forward jacks are handled by two men each and lift the track up about two-thirds the height it is to be raised out of the ballast. No tampers are required here as the stone being newly unloaded runs under the ties. The other two jacks keep somewhat over half a rail behind the first jacks and raise the track to the full height. Each joint and center tie is tamped with tamping bars and sledged down slightly. Two men are provided with each jack; the second man carries a sledge and ballast fork with him, and he both sledges down the joint and fills in the ballast for the tampers. Two men tamp with each jack and one man levels the track, making 13 men in all with the jacks. This gang is in charge of an assistant foreman, who does the sighting, using a standard lifting board and sighting block. Two men on each side follow the jacks filling in the ballast, while 20 men tamp the ends of the ties and as far under the tie as they can reach. These men use a tamping spade, shown in the accompanying drawing, which has been found to be a very light and efficient tool for this work. The men tamping behind the jacks are distributed in ten sets of two men each, five sets on each side of the track. Each double set of men is numbered 1, 2, 3, 4 or 5, and tamps one-half a rail length; these men go forward to the half rail previously marked with their number on the rail by the foreman and repeat the operation. In this way the men know just where to go and the foreman is enabled to tell just how well or how poor each set of men tamp. The result of this check on the work of the men is very marked. The four men with ballast forks fill in the ends of the ties ahead of the spade men so that these latter men do not have to do any filling in. Neither do they put their foot on the spade when they tamp but rather shove the stone under the tie evenly.

The spade has been found to be a light, convenient tool to work with, making quicker work possible, while the track is evenly tamped and settles evenly under traffic. When trains pass over the track thus tamped it will remain practically as smooth as before it was lifted and no slow order becomes necessary. Of course, as the work of raising is completed for the day, which is when all the stone unloaded that day has been put under, the foreman looks back over the track just raised and raises any places which may have gone down. He cleans all stone from the top of the ties and tamps about 16 in. inside of the rail in the center of the track. An assistant foreman following with eight men lining is enabled to keep the track in perfect line at all times, so that no slow order is necessary and trains pass at full speed.

Track lifted in this manner can be allowed to run for a week or more before the section gang needs to follow up with the final surfacing. With 10 men using tamping picks this gang can easily keep up with the lifting gang. A very light unloading for back fill and the final dressing up complete the operation. With proper care in unloading, no stone need be picked up or moved.

The advantages of this method are, that the stone is always handled shortly after unloading, when it is loose, more than two-thirds of it going to its permanent place by gravity alone. The men engaged always see the end of their day's work and hurry to get to it. The foreman has a knowledge of how well his men do their work, and when a gang is properly handled there is created a spirit of rivalry.

To accomplish the results described it may be necessary to change the work train arrangements for handling and unloading the stone, as it is necessary to get the day's stone on the ground early each morning, but any extra effort or nominal expense added to the train service is amply repaid in a saving of labor in putting in the ballast.

STANDARD PRACTICE CARDS ON THE ERIE.

Approved Methods for Performing Different Maintenance of Way Operations.—Work Standardized on All Divisions.

BY O. S. BEYER, JR.

Under modern operating conditions no part of the physical plant of our railways is more severely taxed than the roadbed and track, and no phase of the general railway maintenance problem, perhaps, presents so many difficulties as that of maintaining the roadbed and track in fit condition for the safe and efficient con-

No. 1. ERIE RAILROAD COMPANY. 8-31-11										
NEW YORK, SUSQUEHANNA & WESTERN RAILROAD			NEW JERSEY & NEW YORK RAILROAD CHICAGO & ERIE RAILROAD							
MAINTENANCE OF WAY AND STRUCTURES										
STANDARD PRACTICE:—Elevation and Gauge of Track										
TABLE FOR ELEVATION OF OUTER RAIL										
Degree of Curve	30-Miles Inches	40-Miles Inches	50-Miles Inches	60-Miles Inches	Track shall be gauged to Gauge allowed account of Rail-wear					
I	1 1/4	1 1/2	2 1/2	4	8 1/2	4 9				
2	1 3/4	2 1/4	3	4 1/2	4 8 1/2	4 9				
3	1 3/4	3 1/4	4 1/2	6	4 8 1/2	4 9				
4	2 1/4	4 1/4	6	6	4 8 3/4	4 9 1/4				
5	3	5 1/4	6	...	4 8 3/4	4 9 1/4				
6	3 1/2	6	6	...	4 8 3/4	4 9 1/4				
7	4 1/2	6	...	...	4 8 3/4	4 9 1/4		
8	4 1/2	6	...	...	4 8 1/2	4 9 1/2		
9	5 1/4	6	...	...	4 8 1/2	4 9 1/2		
10	6	6	...	...	4 9	4 9 1/2		
11	6	...	...	...	4 9	4 9 1/2	
12	6	...	...	...	4 9	4 9 1/2	
13	...	...	...	...	4 9	4 9 1/2
14	...	...	...	...	4 9	4 9 1/2
15	...	...	...	4 9	4 9	4 9 1/2	
Maximum elevation should not exceed 6 inches.										
(OVER)										

Fig. 1—Standard Practice Card for Elevation and Gage of Track.

duct of high speed and heavy tonnage transportation. That these problems are very serious must be admitted when the many recent failures, which have resulted in such disastrous accidents, are considered. Failures and waste on railways, where they occur, are in part at least due to faulty practices. One of the problems which must be solved effectively is the prevention of faulty practices and their eradication where they exist.

An attempt in this direction made by the Erie Railroad is the extension of the Standard practice card system, as adopted in the mechanical department, to the maintenance of way department. The work of maintaining the roadbed and track of a railway property employs many processes and methods which are

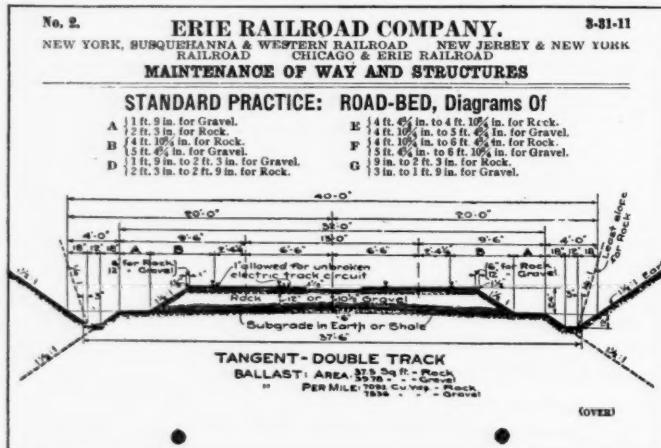


Fig. 2—Standard Practice Card for Roadbed Diagrams.

more or less the same and in general use over the entire system. Certain definite conditions which are continually being disturbed by the wear and tear incident to operation are periodically re-established. The standard practice system takes cognizance of these characteristics of maintenance of way work and seeks to

standardize the various methods, practices, and conditions in a positive and effective manner.

The benefits which result from a system of this kind are extensive. Instead of following a multitude of varying practices and methods for the accomplishment of certain results, the best and identical methods are employed over the entire system. This eliminates, to a certain extent, waste of material, and assures a greater uniformity in the purchase of material. It insures the use of good and correct processes where otherwise questionable

No. 2. ERIE RAILROAD COMPANY. 8-31-11						
NEW YORK SUSQUEHANNA & WESTERN RAILROAD			NEW JERSEY & NEW YORK RAILROAD CHICAGO & ERIE RAILROAD			
MAINTENANCE OF WAY AND STRUCTURES						

STANDARD PRACTICE: Ballast. Application of, Method to be Employed, and Force Required.

NEW BALLAST.

New Ballast should not be applied until the sub-grade has been prepared to conform with standard section per standard practice card No. 2.

Tracks should be raised to stakes set by engineer.

STONE BALLAST—Method.

Pick tamp all ties on both side from the ends to a point twelve (12) inches inside the rail. Center of ties to be lightly filled by use of ballast fork. Allow sufficient time (minimum, one week) to elapse for ties to secure a good bearing, then resurface the tracks with a light raise. In resurfacing joint ties they should be tamped hard at the joint end, easing off on the quarter.

When track has been put to a true line fill and trim to standard section per standard practice card No. 2. Ballast should be neatly lined on the outsides by using a straight edge six (6) inches wide.

(OVER)

Fig. 3—Front of Standard Practice Card for Ballasting Work.

or faulty ones might be employed. Guess work is done away with. Individual judgment, based on limited experience, is replaced by the judgment and experience of a large body of capable men. It establishes definitely, over the entire railway, just exactly what special conditions are to be maintained. The card

All surplus ballast should be piled and promptly removed after second raising and resurfacing.	
Use ballast forks for handling stone ballast.	
In gravel, granulated slag and cinder ballast, tamping picks should be used only on joint ties, using shovels on all others.	
STONE BALLAST—Force.	
Foreman 1	
Assistant Foreman 1	
Assistant Foreman 1	
Laborers 1	
Laborers 2	
Laborers 2	
Laborers 2	
Laborers 4	
Laborers 4	
Laborers 16	
Laborers 4	
Total 37	1
Sighting track.	1
Track tampers.	1
Digging jack holes.	1
Holding ties tight to rail.	2
Driving spikes home.	2
Operating jacks.	4
Tamping at jacks.	4
Tamper.	16
Partially filling and dressing track.	4
Water carrier.	1

Fig. 4—Back of Standard Practice Card for Ballasting Work.

feature of the system insures the carrying out of the standardized practices, since the cards are placed in the hands of every officer of the department, from the very head down to the section foreman. They all are required to familiarize themselves thoroughly with the practices as established. Instead of disseminating the instructions with which the cards deal either verbally or by means of circular letters, placards, or bulletins, the instructions are forcibly and systematically brought to the attention of the men in the field, who, more than anyone else, are to be guided by them. Verbal instructions are soon forgotten or become stale;

circular letters are buried in the files; placards are lost and bulletins are either buried, lost or forgotten. Through the systematic method of establishing and introducing these cards, as well as the prescribed necessity for maintaining a continual check, the higher department officers, too, become thoroughly familiar with the standardized practices. By means of this system, a direct channel is opened, which enables officers to get certain kinds of instruction down definitely to where they are needed. In general, this plan of standardizing practices weeds out faulty practices and establishes good ones, all of which helps to effect efficient and economic maintenance and safe operation.

HOW ESTABLISHED.

The supervision of the establishment of the standard practice card system and the continued introduction of new cards is the

No. 4.	ERIE RAILROAD COMPANY.	8-31-11																				
NEW YORK, SUSQUEHANNA & WESTERN RAILROAD NEW JERSEY & NEW YORK RAILROAD CHICAGO & ERIE RAILROAD																						
MAINTENANCE OF WAY AND STRUCTURES																						
STANDARD PRACTICE: Laying Rail. Method to be Employed, and Force Required.																						
LOCATION. Location is determined upon at the end of the calendar year. During the winter when track work is impracticable, the adzing, as far as possible, should be done.																						
SUPERVISION. Whenever possible the Supervisor should be present when the rail is relaid.																						
Force required for laying single rail:																						
<table border="0"> <tr> <td>FORCE:</td> <td></td> </tr> <tr> <td>Foreman</td> <td>1</td> </tr> <tr> <td>Assistant Foreman</td> <td>1</td> </tr> <tr> <td>Assistant Foreman</td> <td>1</td> </tr> <tr> <td>Flagmen</td> <td>2</td> </tr> <tr> <td>Tong men</td> <td>8</td> </tr> <tr> <td>Applying joints</td> <td>8</td> </tr> <tr> <td>Water carrier</td> <td>1</td> </tr> <tr> <td>Total force</td> <td>40</td> </tr> <tr> <td colspan="2">(OVER)</td> </tr> </table>			FORCE:		Foreman	1	Assistant Foreman	1	Assistant Foreman	1	Flagmen	2	Tong men	8	Applying joints	8	Water carrier	1	Total force	40	(OVER)	
FORCE:																						
Foreman	1																					
Assistant Foreman	1																					
Assistant Foreman	1																					
Flagmen	2																					
Tong men	8																					
Applying joints	8																					
Water carrier	1																					
Total force	40																					
(OVER)																						

Fig. 5—Standard Practice Card for Laying Rail.

assigned duty of an expert sufficiently familiar with maintenance of way work to properly suggest and draft up cards himself, check proposed cards, and in conjunction with the head of the department, decide from the result of criticisms submitted on pro-

No. 6.	ERIE RAILROAD COMPANY.	8-31-11
NEW YORK, SUSQUEHANNA & WESTERN RAILROAD NEW JERSEY & NEW YORK RAILROAD CHICAGO & ERIE RAILROAD		
MAINTENANCE OF WAY AND STRUCTURES		
STANDARD PRACTICE: Program of Season's Work by Regular Section Forces.		
Section Force: One Foreman. The number of men to be designated by the Superintendent and approved by the Engineer, Maintenance of Way. Under normal conditions the following routine will prevail and in the order named:		
<ol style="list-style-type: none"> 1. Drain the road-bed by removing all obstructions in ditches and culverts in order to allow water to run off freely. 2. Clean up yards, tracks, station grounds and right of way. 3. As the frost leaves the ground remove all shims and take them to tool-house. 4. Go over entire section and do the preliminary surfacing, tamp loose ties, drive home all spikes and tighten all bolts. <small>(OVER)</small>		

Fig. 6—Front of First Standard Practice Card Outlining Program of Season's Work.

posed standard practices which the best practices are to be followed. First, all those practices most apparent and universal are outlined, submitted to every general officer of the department and to the division engineers, who, together with their individual staffs, discuss the proposed practices and criticize them. The criticisms are then submitted to the officer supervising the installation of the cards, who carefully goes over them, tabulates them, and finally, together with the head of the department and perhaps some other persons peculiarly fitted to pass judgment on some particular practices, decides what the final standard practices shall be. These practices are then outlined on a card in clear, concise language. Illustrations, if necessary,

are employed to make the meanings clearer. The cards are then distributed to the various officials and foremen who are to use them and be guided by them.

From time to time, as certain things occur which indicate faulty practices, investigations are made with a view of eliminating them and establishing in their place correct practices by

5. Make tie renewals and switch timber renewals in main track, beginning at end of section farthest removed from, and working toward tool-house.
It is required that all ties be fully spiked, tamped, and ballast replaced the same day they are applied.
In putting in new ties the use of picks or sharp pointed instruments is forbidden.
During the renewal all condemned ties removed from track should be piled for burning as removed and burned each week when conditions permit.

6. After new ties are placed in track a sufficient time (minimum one week) should elapse to permit the new ties to secure a good bearing, when the track should be gone over, giving a finishing surface, and aligned by use of level and gauge, trimming the ballast at the same time to conform to the standard section per standard practice card No. 2, and clean ballast of vegetation.
Note: When the rail or ballast program provides for rail renewal new ties should not, under normal conditions, be applied until new rail or ballast is laid.

Fig. 7—Back of First Standard Practice Card Outlining Program of Season's Work.

means of standard practice cards. In order to eradicate as promptly as possible all methods, practices, and conditions which are faulty and wasteful, everyone is encouraged to make recommendations as soon as things are noted to go wrong, or in time to prevent things going wrong. These recommendations are carefully investigated and adopted whenever of sufficient importance to warrant their application. Thus it is not the duty of anyone in particular to help effect the desired object of the standard practice card system. Everybody is expected and encouraged to take a hand.

HOW USED.

The standard practice cards, as finally issued, fit into a looseleaf binder of convenient size to be carried in a pocket. Those officers and foremen actively engaged in supervising and directing maintenance of way work are required to carry these books with them continually while performing their duties, so that they will

No. 6.	ERIE RAILROAD COMPANY.	Card 2.
NEW YORK, SUSQUEHANNA & WESTERN RAILROAD NEW JERSEY & NEW YORK RAILROAD CHICAGO & ERIE RAILROAD		
MAINTENANCE OF WAY AND STRUCTURES		
<ol style="list-style-type: none"> 7. It is required that the right of way be mowed at the time designated by the Engineer, Maintenance of Way, to prevent noxious weeds going to seed. The order of this item may be changed if necessary. 8. Do the necessary ditching and repairing of embankments. 9. Renew the necessary switch timbers and ties in side tracks, cutting them off at the proper length. 10. Reduce the force to meet winter conditions. <p>Note: It is required that care be exercised at all times to keep all switches fitting tightly; switch stands properly secured; frogs tight and in proper position; guard rails properly secured in correct position and track to proper gauge, cross level and super-elevation. All emergencies should be properly met regardless of the order of routine.</p>		

Fig. 8—Front of Second Standard Practice Card Outlining Program of Season's Work.

always have them ready for reference in case any questions come up regarding proper practices and methods to be employed or standard conditions to be maintained.

When new cards are received outlining a new standard practice to be followed, the division engineer, at the first meeting of his staff, introduces a thorough discussion of the new cards. The various features of the standardized practices in their application,

are thoroughly explained and questions raised and answered in regard to them. Each supervisor or roadmaster and section foreman, after having had opportunity to thoroughly familiarize himself with the new practice and its purpose, applies it in his future work. Constant vigilance from the highest officer in the department, down to the supervisor or roadmaster, is maintained by checking the actual work done under the direct supervision of the section foremen, with the results as they should be secured by

No. 8. ERIE RAILROAD COMPANY. NEW YORK, SUSQUEHANNA & WESTERN RAILROAD NEW JERSEY & NEW YORK RAILROAD CHICAGO & ERIE RAILROAD MAINTENANCE OF WAY AND STRUCTURES	4-12-11
<p>STANDARD PRACTICE: Tie Inspection and Renewals.</p> <p>INSPECTION:—The selection of ties to be removed from track for renewal on each Division should be made by one or more track Tie Inspectors, as soon after March 1st of each year as weather conditions will permit, and prior to July 1st, will submit his report direct to the Division Engineer.</p> <p>Each tie to be removed must be carefully examined, the local conditions being carefully studied and taken into consideration; the condition of ties on each side, and the amount and character of traffic, the location of the ties, whether on a tangent, curved track or under a joint, etc., must be carefully considered.</p> <p>A much more rigid inspection is possible on straight track with light traffic, than where traffic is heavy and on a sharp curve.</p> <p>When the inspection is made the Section Foreman on each section shall be present and assist in the work. A third man will be necessary to do the spotting and carry the work along rapidly. The inspection should begin at the lowest mile post and work toward the greater</p>	
(OVER)	

Fig. 9—Front of First Sheet of Standard Practice Card for Tie Inspection and Renewals.

the application of the standardized practice. Furthermore, when the prizes are awarded to the section foremen each year after the annual inspection made by the officials, besides taking into consideration the riding qualities of the roadbed and condition of the track as determined by the track testing and inspecting car and the general appearance of the right of way, the adherence of the foremen to the standard practices is also taken into consideration. All this tends to keep everyone keyed up to the spirit of the standard practice card system and insures the carrying out of the work as desired.

EXAMPLES.

A few standard practice cards, as used on the Erie Railroad, are appended hereto, by way of illustrating the system in its

<p>MARKING:—Ties to be removed should be designated by marking the web of the rail directly over the tie, with a spot of white lead paint, as directed by the Engineer, Maintenance of Way. Where it is expected the rail will be removed prior to the change of ties, in addition to the spot on the rail, the tie should be spotted near its end.</p> <p>LOCATION:—As the tie inspection is made the total number of ties in each mile will be counted and shown, and the number to be renewed in each quarter of a mile will be shown; also the number of unapplied ties.</p> <p>Where there is no mile post, telegraph poles will be used to designate the location.</p> <p>When the inspector has finished each section, he will forward one copy of his inspection report to the Division Engineer, one to the Supervisor and one to the Engineer of Maintenance of Way, and leave one with the section foreman. The Supervisor will then be enabled to distribute the ties needed for each mile or quarter of mile, per Standard Practice Card No. 7.</p> <p>RENEWALS:—When the Section Foreman has completely finished the renewal of ties on any one mile, he will forward a statement to the Supervisor, showing the exact number of ties that he changed on the section, whether it agrees with the inspection report or not, and if not, an explanation why.</p>

Fig. 10—Back of First Standard Practice Card for Tie Inspection and Renewals.

application. The cards are 4 x 6 in. in size, and where necessary, are printed on both sides. It oftentimes happens that a complete practice cannot be entirely outlined on one card. In such a case two or more cards are used. The cards are punched ready for insertion in the loose-leaf binders.

Fig. 1 shows the card which standardizes the elevation and the gage of the track. Not much comment need be made in connection with the adoption of this first card. This particular

practice would naturally be about the first one to be standardized.

Fig. 2 illustrates diagrammatically the features and dimensions of the grade, subgrade, and drainage arrangements which should be maintained for the different types of roadbed employing either rock or gravel as ballast. Data is also provided giving the area of the ballast and the amount per mile necessary. The benefits resulting from this card are apparent.

Figs. 3 and 4 indicate the force required, the method to be em-

No. 8. ERIE RAILROAD COMPANY NEW YORK, SUSQUEHANNA & WESTERN RAILROAD NEW JERSEY & NEW YORK RAILROAD CHICAGO & ERIE RAILROAD MAINTENANCE OF WAY AND STRUCTURES	Card 2.
<p>The Supervisor will then forward to the Division Engineer and the Engineer of Maintenance of Way a report showing the number of miles completely finished on his sub-division, on the 10th, 20th and end of each month. No ties should be reported in a mile unless all the ties to be changed have been put in.</p> <p>No ties shall be removed from the track except broken ties or ties marked for renewals (except in cases of emergency), without the express permission of the Division Engineer, to vary from the inspection.</p> <p>SWITCH TIES:—Switch ties which have become unserviceable from decay or other causes will be renewed. These will be measured and the number and length of each to be renewed will be recorded and the rail painted by the Inspector, as for cross ties. The track and switch should be named and this information given the Division Engineer to enable the proper distribution of the switch ties to be made from the cars, which should be loaded in station order and lengths for this purpose.</p>	
(OVER)	

Fig. 11—Front of Second Standard Practice Card for Tie Inspection and Renewals.

ployed and the application of ballast. This card eliminates practices which are based on individual judgments, and substitutes, in their place, practices which are the result of the experience and judgment of a considerable number of persons. It outlines the forces to be employed in laying ballast and arranges their distribution. This assists in lining up the gangs at the start of the season's work.

Fig. 5 shows the card which standardizes the method employed and forces required to lay rail. This practice, like the one illustrated by Fig. 3, determines the best and safest methods. It tends to eliminate lost motion and waste. By designating the proper organization of the force employed and the duties of each member of the force, it ought not to be a difficult matter for the sec-

<p>SIDINGS:—It is desirable as far as possible, that the instructions above be applied to renewal of ties in sidings. The record of ties should be kept with the name of the siding instead of the quarter mile, the painting or marking to be done in the same way.</p> <p>Chestnut and cedar ties may be used on tangents of standing or back off track. A separate list covering such tracks should be kept in such cases.</p> <p>GENERAL:—It should be distinctly understood by the Track Supervisor that the above standard practice does not in any way relieve him of his responsibility for the proper maintenance of the track under his charge. If, on being furnished by the Division Engineer with statement of ties to be removed he is not satisfied that this number is sufficient for proper maintenance of the track, he shall satisfy himself as to the additional number required in the same detail the former inspection was made and recommend to the Division Engineer that the additional number be furnished him at each point where his judgment has indicated as being necessary. The Division Engineer will then assume the responsibility of failing to furnish the additional ties if, in his judgment, they are not needed.</p>
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Fig. 12—Back of Second Standard Practice Card for Tie Inspection and Renewals.

tion foreman and the supervisor to decide promptly how best to handle the work.

Figs. 6, 7 and 8 illustrate a card outlining the program of the season's work by the regular section forces. This is a comprehensive attempt to fix definitely the general run of work of the regular forces. That one of the results of following this practice will be increased efficiency must be realized.

Figs. 9, 10, 11 and 12 illustrate the card standardizing tie in-

spection and renewals. While, of course, this card does not outline which ties should be renewed and which should not, it does outline the method to be employed when making the inspections, and standardizes the marking, reports and methods of distributing new ties. Uniformity and system in this particular work helps greatly to avoid confusion and aggravating and expensive mistakes in the removal and renewal of ties.

While the foregoing illustrations are of a more or less general nature, the possibilities and range of application of the standard practice card system in maintenance of way work will be recognized. The first cards adopted usually deal with the more general practices. As the system is extended, the more special practices are standardized.

PERSONAL CONTACT WITH THE FOREMAN.*

BY W. W. GREENLAND,

Assistant Engineer, Wabash, Moberly, Mo.

If you want an effective organization take care of the men. We have endeavored to follow this principle in the handling of foremen and future foremen on this division. The foremen and future foremen are made to feel that they are one of the family. The supervisors going over their territory on motor cars get in very close touch with the foremen and the men. In addition to talking over track matters and the economical handling of men and material, they go into the question of the condition of the foreman's house, whether it needs repairs, whether he has enough ground for garden, etc.

The engineer maintenance of way or assistant engineer makes trips over the road either on a hand car or motor car, not only to advise the foreman that a joint is low in a crossing, but to find out how the foreman and men are satisfied. They inquire as to their health. If any one is sick or needs a slight operation, they advise him about the company hospital at division point, or suggest a change in location. If the foreman or men come to the hospital, they send some one from the office to see them.

The superintendent makes frequent trips in his car over the division, "highballs" foremen and men and at station stops where the foremen and men happen to be at work, gives them a word of encouragement and asks how they are getting along. We do not make a practice of reducing our section forces in winter months below the requirements of safety, thereby protecting our tracks and giving the future foremen continuous service which tends to make them more contented. Good treatment of foremen and future section foremen, the supplying of good section houses and ground, the hospital service, a trip to the city with the supervisor at times to look over new work or terminals, makes satisfied men who know they will be taken care of in sickness or in health. When these men go out on a car at 7 a. m. they are thinking of their track, and continue to think of it most of the 24 hours. In this way foremen are held and the future foremen are shown that if they work to the interest of the company they will be looked after and will later be made foremen.

A CORRECTION.

We are advised that figures relative to the costs of protecting the yards of the Cotton Belt and Iron Mountain roads at Bird's Point, Mo., just above Cairo, Ill., from the floods of the Mississippi river, which were given in our issue of April 19, as stated by A. M. Van Auken in a discussion before the American Railway Bridge and Building Association, should be revised as follows: In 1897, 3,750 lineal ft. of bank were protected at a cost of \$26,634.19; in 1903, 2,930 lineal ft. of bank were protected at a cost of \$19,631.85.

*Submitted in the contest on The Section Foreman Problem, which closed April 25, 1912.

ACTUAL ECONOMY IN RAILWAY MAINTENANCE.

BY R. P. BLACK,

Engineer, Maintenance of Way, Kanawha & Michigan.

The study of economy in railroading is largely relative. The economies practiced by a railway of small gross earnings per mile would not be applicable to one of very large earnings and of high speed traffic with excellency of service the paramount issue.

Large opportunities for economies in the purchase of material are afforded by the selection of materials which will give the best, safest and longest service for the money value. This does not necessarily mean that the appliance will be the best that can be had or the most durable. Durability in many a case is very costly. Durability regardless of cost is frequently the standard of the heads of the maintenance of way departments of the larger railway systems. This may be the best policy, but it is often not the most economical.

Since the compound interest on money invested in a device will become equal to the principal in 12 years at 6 per cent. it is not economy to tie up money in an additional first cost to get relatively longer service. Any additional capital is a loss equal to 6 per cent. per year. Should this capital be twice the amount required to get 12 years' service, there is a loss of 100 per cent., being the 100 per cent additional capital plus an equal amount of interest less the first cost required for renewal.

The selection of suitable frogs, switches and guard rails for the renewal and maintenance of turnouts, permits of a great amount of economy. The following practice has been found to be economical in the maintenance of turnouts over which the traffic is chiefly heavy tonnage freight trains without high speed passenger service. The main track is laid with 90 lb. rail, sidings with 70 lb. The country traversed has a mild temperature.

For main track turnouts where the wheelage movement is small over the diverging track the single spring frog giving the closed rail for the main track movement is used. This frog will last in the track as long as the rail which is 8 to 10 years and its cost, say \$48, is nominal. The switch for such a turnout should be made of rails of the same analysis or consistency as the main track. Such a switch whose cost is \$43 and whose life is the same as the rail in the main track, is the most economical.

For turnouts, where the wheelage movement to the diverging track is 25 per cent. or more of the total, the short solid cast manganese steel frog should be used. This frog's life is at least 10 years and on account of being free from bolts is very cheap to maintain. The cost of such a frog is \$85, which compared with the cost of three single spring frogs which would wear out in the same time, at \$48 less \$6, each scrap value, gives a saving of \$41. Besides this saving there will be less labor expense for maintenance which will more than discount the interest on the additional first cost of the higher priced frog. The switch for such a turnout where the wear would be considerably more on the point closed for the diverging route, should be made of the same rail as the main track, equipped with a 30-in. or longer manganese steel point on the side to be closed for the diverging route. Service tests of such manganese steel points at turnouts such as those leading from a yard, where all freight trains pull into and out of the main track, have demonstrated their lasting qualities. The manganese point will last at least five years or more in such a place, whereas the ordinary Bessemer or Open Hearth steel point would not last one year. The cost of a switch equipped with a manganese steel point on one side is \$56, as compared with \$43 for the ordinary steel rail switch. This is an increased first cost of \$13 per switch, but it will show a saving in five years of \$82.50.

The guard rails for the two turnouts mentioned should be of similar design. For such service the single piece guard rail made of cast manganese steel should be used. Its construction of manganese steel will give it a life of at least that of the rail in the track. The cost of this single piece cast guard rail is \$16, which

compared with the price of the 15 ft. rail, guard rail at \$10.45 plus 2 clamps at \$3.50 each, making a total cost of \$17.45, shows a saving of \$1.75 for each guard rail, or \$3.50 for the turnout. The use of these improved frogs, switches and guard rails for a turnout of a heavy wheelage movement over the diverging route will show a total saving for each turnout of \$127.

For sidings the general practice is to relay the existing lighter rail with the second-hand rail taken out of the main track. This permits of using the second-hand frogs, switches, etc., recovered from the main track in side track turnouts or industrial tracks where the wheelage is not very heavy. In most cases the switch material recovered can be used without any additional use of new material. In the case of badly worn second-hand frogs and switches, since the greatest wear is shown in the plates, they can be made good by the purchase of new slide plates for the switches and the use of repair parts for the frogs. The cost of a complete set of 70 lb. switch plates is \$7.72 less a credit of scrap value of \$1, or \$6.72. Therefore, not considering the cost of the repair part for the frog which generally can be gotten from a scrap frog, second-hand frogs, switches and guard rails can be provided for renewal of such turnouts that will give the required service at a very nominal cost. It has been found that only about 10 per cent. of the second-hand frogs and switches recovered from the main track go to the scrap pile.

On account of the increased axle load of engines and the softness of the Bessemer and Open Hearth rail the old style stiff frog made of the ordinary rail can no longer stand the service in yard tracks that have considerable wheelage. Due to the greater cost of the hard center and of the solid manganese steel frogs, it has been quite a question of values in the selection of the most economical frog and switch material for general utility in yards. For turnouts in yards where there is a very small wheelage movement over the diverging track, the single spring frog at a cost of \$42 is economical. The switch should be 15 ft. long and made of rail of the same consistency as the rail in the track. For turnouts such as ladder tracks the double spring frog is economical. This style frog has been given hard service tests and has proven to be safe and of sufficient durability to last as long as the rail in the track. In very cold climates where considerable snow is encountered this style frog would not give entire satisfaction on account of its liability of being blocked with snow. The cost of a double spring frog made of 70-lb. rail is \$47.60. The more economical switch to use would be the 15 ft. switch equipped with the manganese point on the side getting the greater wear. For turnouts off of tracks used by engines such as in and outbound tracks to the roundhouse, the short solid manganese steel frog should be used.

A very cheap and effective guard rail for less important yard turnouts can be made by the section foreman out of the scrap 90-lb. rail and second-hand tie plates. This guard rail is made by putting the bends as usual in the 15 ft. piece of rail, but instead of shearing off the base on the gauge side, 5 holes are drilled for spiking to the ties. In placing the guard rail for service the base of the 90-lb. rail is slipped under that of the 70-lb. track rail, and the guard rail spiked down to gauge. The 70-lb. track rail is held up from the tie by the use of the second-hand tie plates cut off to fit the unsupported part of the base of the 70-lb. rail. The top of the 90-lb. guard rail is the same height as the 70-lb. track rail. When the weight of the wheel is on the track rail, it bears down on the flange of the guard rail and with the help of the spikes, prevents it from spreading, no clamps being necessary. The cost of such a guard rail is:

0.25 Ton of scrap 90-lb. rail.....	\$3.50
2 Metal foot guards.....	.50
16 Second-hand tie plates.....	.80
Labor	2.00
Total	\$6.80

The Great Western Parana Railway, Brazil, has been organized in London for the construction of a railway from Ponta Grossa to Sete Quedas.

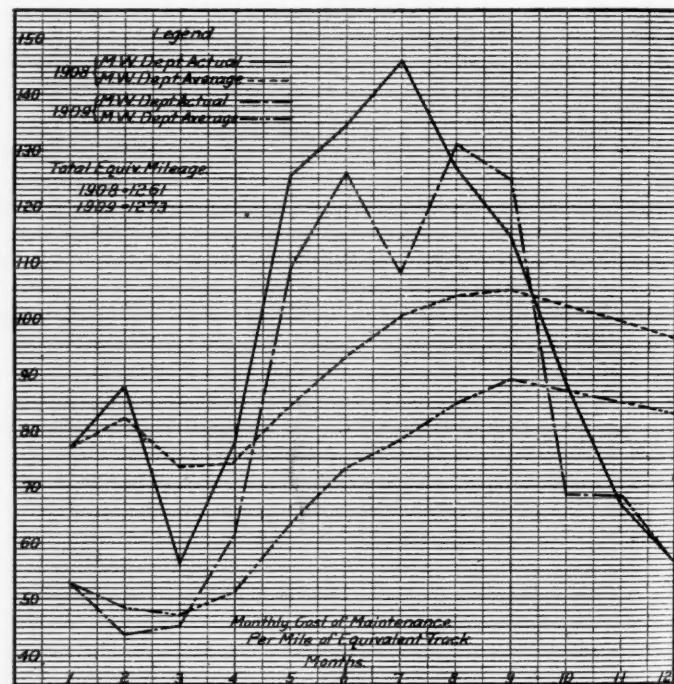
EFFICIENCY IN TRACK MAINTENANCE.

BY C. E. LINDSAY,

Division Engineer, New York Central & Hudson River.

The elements entering into the consideration of this subject are numerous and varied. The old saying is that "most anyone can make a good railway if he has all the men and materials he wants, but it takes a good man to make a first class railway out of two streaks of rust and a right of way."

It is not my purpose to dilate upon what constitutes good track, but to show a convenient way to measure the relative efficiency of supervisory officers in charge of track maintenance. Other things being equal, that track is most economically maintained that costs the least per unit on the average for a long term of years. Track conditions, as regards safety comfort and economy, are AVERAGE conditions, and other things being equal, the man who maintains his track to the highest average condition, is the most economical. To illustrate: In the renewal of cross ties, the man who renews all the ties in a given piece of track, and who thereby may for awhile have a very



Graphical Method for Showing Costs in Maintenance Work.

strong, smooth track, is not as efficient as the one who by the judicious renewal of a tie here and there, patiently giving the tie every chance to serve out its life, and carrying on his renewals with the least disturbance of ballast, surface and line, maintains his track in better average condition or at lower average cost.

Track conditions as to safety and comfort are difficult to exactly define. The supervisor must live with it intimately day in and day out to be able to fairly judge of the results attained by different foremen in maintaining it in average condition. His opinions as to these qualities of track are based on his best judgment after years of experience. They are not always unbiased and often disagree with the opinions of those who may be as well qualified to judge.

The same principle holds true with respect to rail and other material in greater or less degree. The track supervisor or foreman is not always left to the exercise of his own judgment exclusively as to renewals of material, so that any method of comparison of results that attaches much value to the element of material is apt to lead to erroneous conclusions, but the duty devolves particularly on the foreman to get "A fair day's work

for a fair day's pay," and to use the labor under his command to the best advantage.

"In days of old when knights (of the road) were bold and (railway) barons held their sway," it was possible for the roadmaster or engineer to adapt his system of accounting to the work to be done and what few figures were kept outside of those necessary for financial probity, were for the officers' use in determining unit costs and relative results, but in these days of state and interstate regulation of corporate accounting, there are so many blanks to be filled out with figures all bearing wholly on the accounting features of the transaction and with little or no time or regard for unit costs or relative efficiency, that it is all the harassed foreman or supervisor can do to make his account balance to the last cent, even though while he is doing so the unit cost of the work is soaring out of sight.

In other words, the present-day system of accounting has been dominated by an auditor and not by an efficiency expert. In the whole maze of records and accounts, classifications and sub-classifications, hair splitting and hair pulling, as demanded by the public commissions of today there are no records that of themselves give to "the man behind the gun" any idea of his ability to hit the mark and it is not until the last analysis of the operation of a great railway system that we begin to read about the cost per train mile or per mile of road. Such statistics are too old and too general to be of much value to the trackman who wants to know today what his work of yesterday cost, but even more than that, wants to know day by day what the average cost of his work is.

With the voluminous and wasteful system of accounting exacted today for apparently the sole purpose of insuring "honest," it seems sinful to greatly add to it for the purpose of

studying "efficiency" so that the writer has sought some feature of the existing accounting scheme that could be used as a basis for this study with the least possible additional bookkeeping.

As heretofore intimated, the cost of material used in track maintenance is not wholly under a supervisor's control, so that it should not enter into the calculations that from month to month are used to test the results of our work, we turn rather to the monthly pay roll and to the distribution sheet accompanying it which shows the 25 or 30 different directions in which our efforts have been extended.

It is possible to keep additional records to show for instance the number of ties put in per man per day, or the feet of rail per day per man, etc., but such figures are easily misconstrued and difficult to verify, so that they are often valueless as an effective means of attaining true efficiency, but by taking the total pay roll month by month and finding what it costs per unit per month by classification to maintain track, we place before the responsible officer a measure of his ability that appeals at once to his pride and his common sense.

The question arises just here, "what is the proper unit of cost?" evidently it is not fair to take the miles of road because of the difference in the number of tracks per mile of road, nor is it fair to take the miles of track because of the difference in the character of track maintained. A unit based on judgment, has been generally used for such comparisons, which regards two miles of side track as the equal of one mile of main track and 15 switches as costly to maintain as one mile of main track. The unit is purely empirical, but is reasonably accurate for comparative purposes when traffic conditions are given due consideration.

Table 1 shows how these figures may be made useful to the

TABLE 1.—COST PER MILE OF EQUIVALENT TRACK FOR LABOR CHARGED TO M. W. & S. ACCOUNTS FOR JANUARY.

Sub-Division.	Miles.	Super-intendence.	Ballast.	Track Labor.	Roadway.	Removal of Snow.	Bridges.	Grade Crossings.	Buildings.	Tools.	Totals.
A	300.12	\$1.44	.....	\$8.89	\$0.82	\$23.32	\$0.01	\$0.16	\$0.84	\$0.06	\$36.54
B	296.21	1.40	.....	14.26	.64	16.00	...	.12	.29	.50	33.19
C	306.67	1.36	.....	8.89	.24	24.23	...	.24	.13	.31	35.40
D	207.17	1.41	.....	18.00	2.36	5.13	.08	.07	...	.38	27.43
E	192.26	1.04	.....	10.10	.80	17.44	.17	.21	.08	.20	30.04
Total	1,302.43	\$1.35	.....	\$11.98	\$0.88	\$18.11	\$0.04	\$0.16	\$0.31	\$0.29	\$33.12

TABLE 2.—COST PER MILE OF EQUIVALENT TRACK FOR LABOR CHARGED TO M. W. & S. ACCOUNTS FOR YEARS ENDING DECEMBER 31, 1916 AND 1915.

Sub-Division.	Miles.	Year.	Super-intendence.	Ballast.	Track Labor.	Roadway.	Removal of Snow.	Bridges.	Grade Crossings.	Buildings.	Tools.	Totals.
A	300	1916	\$16.96	\$1.83	\$364.97	\$43.53	\$21.74	\$3.47	\$5.10	\$3.15	\$3.39	\$464.14
	292	1915	16.87	4.13	344.19	25.22	64.18	1.19	5.03	2.13	3.85	466.79
B	295	1916	16.80	.36	359.38	48.09	22.54	.97	8.65	4.28	4.82	465.89
	294	1915	16.19	3.41	345.11	55.76	43.98	2.41	12.73	3.91	4.45	487.95
C	301	1916	16.60	2.11	371.23	33.32	38.82	.62	8.63	3.85	3.84	479.02
	294	1915	16.52	1.21	361.59	35.78	56.87	.19	10.73	2.59	2.98	488.46
D	207	1916	17.02	8.73	317.56	46.92	9.78	1.82	6.63	1.09	5.28	414.83
	206	1915	16.13	11.13	276.04	34.43	33.16	1.06	5.61	.25	6.82	384.63
E	192	1916	16.89	...	232.89	54.92	24.16	.32	13.75	.86	4.16	347.95
	192	1915	16.63	1.12	233.45	53.83	39.91	2.12	8.65	1.22	3.82	360.75
Total	1,295	1916	\$16.85	\$2.48	\$342.03	\$42.55	\$24.33	\$1.45	\$8.34	\$2.78	\$4.30	\$434.48
	1,278	1915	16.59	3.98	320.88	40.05	49.28	1.54	8.69	2.27	4.52	448.09

TABLE 3.—COST PER MILE OF EQUIVALENT TRACK FOR ALL EXPENSES OF MAINTENANCE FOR TWELVE MONTHS ENDING DECEMBER 31, 1916, COMPARED WITH PREVIOUS YEARS.

Account No.	Classification.	Entire Division.									
		1913.	Per Cent.	1914.	Per Cent.	1915.	Per Cent.	1916.	Per Cent.	1917.	Per Cent.
1. Superintendence		\$34.90	3.0	\$34.53	3.4	\$40.23	3.8	\$38.68	3.4		
2. Ballast		61.20	5.3	41.55	4.1	48.65	4.6	53.20	4.6		
3A. Tie renewals		243.42	21.0	150.99	15.1	177.84	17.1	213.16	18.6		
4A. Rail renewals		89.66	7.9	66.48	6.7	70.98	6.8	137.81	12.0		
5. Other track material		109.12	9.4	69.97	7.0	62.21	6.0	80.22	7.0		
6A. Track labor		378.34	32.7	352.22	35.4	337.58	32.5	354.25	30.9		
6B. Roadway		27.41	2.3	45.27	4.5	52.74	5.0	50.88	4.4		
7. Removal of snow		38.43	3.3	40.76	4.1	55.54	5.3	25.27	2.2		
9. Bridges, etc.		33.50	2.9	44.62	4.4	28.81	2.7	44.80	3.9		
10. O and U crossings		1.78	.1	9.15	.9	11.17	1.0	9.93	.9		
11. Grade crossings, fences, etc.		19.82	1.7	18.99	1.9	19.11	1.8	17.49	1.5		
12. Snow and sand fences .....		.28	...	.27	...	.40	...	.02	...		
13. Signals, etc.		13.21	1.1	7.41	.7	18.02	1.7	12.11	1.1		
14. Telegraph and telephone lines .....		.18	...	.17	...	.56	...	.02	...		
15. Electric power transmission .....		.02	...	...	...	...	...	...	...
16B. Buildings, fixtures and grounds		82.80	7.1	85.12	8.5	94.84	9.1	40.96	3.5		
16C. Equipment buildings	37.61	3.3		
16D. Other roadway buildings	8.67	.8		
17. Docks and wharves .....		.18	...	.04	...	1.05	.1	...	...
18. Roadway tools		7.11	0.6	8.44	.8	11.88	1.1	13.48	1.2		
19. Injury to persons .....		.18	...	.28	...	.24	...	.21	...		
20. Stationery and printing .....		.16	...	.49	...	.55	...	.61	...		
21. Other expenses .....		.25	...	.49	...	.66	...	4.66	.4		
22. Maintenance joint tracks, Dr.		14.99	1.3	17.45	1.7	6.59	.6	...	...
23. Maintenance joint tracks, Cr. ....		.16	...	.03	...	.16	...	.29	...		
Operating revenue	2.21	...		
Totals		\$1,156.78	...	\$994.17	...	\$1,038.83	...	\$1,144.54	...		

supervisor because they can be given to him within six days after the close of the month's account. From these figures he can see in what direction his average expenditures are being made and can compare with previous years and with the work of other supervisors similarly situated. While there are 25 or 30 classification accounts, the ones given are the ones to which the supervisor mostly charges his expenditures for labor, but the totals at the right include all his expenditures whether shown in detail or not. The division covers about 150 miles of territory with high class, high speed, four-track, passenger and freight lines, also double and single track roads, and large terminal and local yards, so that a wide range of track conditions is met with and the figures therefore are averages which could not be used for comparison with other railways, or even perhaps other divisions of the same road.

In Table 1 the first three sub-divisions are comparable as: (A) comprises a large passenger terminal and large freight terminal yards on a four-track system, with double and single tracks of lighter traffic. (B) and (C) comprise straight away stretches of four-track lines with numerous local yards and passenger stations.

Comparisons of costs of these three sub-divisions extending over a period of years on the equivalent mile basis, show remarkably close figures and comparison of the results attained show a remarkable uniformity in physical conditions of the tracks so that the fairness of the unit is reasonably well shown.

Similarly sub-divisions D and E are two portions of a double track road where the physical and traffic conditions, while different in many ways, balance well and prove the value of the cost per equivalent mile as a basis of comparison.

This table is prepared February 6 for one month ending January 31; on March 6 for two months ending February 28, etc., so that the figures give cumulative average results of great value. At the end of the year a table similar to Table 2 is prepared for convenient reference. In order that the supervisor may know what the entire cost per mile is for both labor and material, and what proportion of the whole each classification is, Table 3 is prepared and furnished within 15 days after the close of the year. Without a very considerable increase in accounting expense it is impracticable to give the supervisor in time to be of much use to him, a monthly statement of his material expenses per mile per classification and for reasons heretofore explained is not warranted. Table 3 includes only expenditures incurred under the direct supervision of the division maintenance of way officers. Tables 1 and 2 include only expenditures made under the direction of the track supervisor. A graphical means of showing costs per equivalent mile comparatively month by month and year by year is shown in the diagram. These figures are based on the same source as those in Table 3. The actual monthly expenditure per mile for each particular month is plotted as a point and the points are joined by lines of peculiar form or color for each year. The cumulative monthly average is shown by the dotted lines at the bottom of the figures, and this average is a most valuable index of the trend of expenses and a guide to the engineer as to his future expenditures.

It is the hope of every engineer, who is at all interested in efficiency, that the methods of accounting may be greatly simplified to the end that he may have some reasonably accurate but prompt means of determining cost without having to spend more for bookkeeping than he can possibly save by the knowledge obtained therefrom.

"The Evolution of Vertical Lift Bridges," is the title of a 16-page booklet by Henry Gratton Tyrrell, of Evanston, Ill., just published by the University of Toronto Engineering Society, in which the development of the vertical lift bridge is traced from the earliest structures to those bridges of this type erected in the past few years.

LOCOMOTIVE BOILER CORROSION AND TREATED WATER.*

BY J. R. FRANCIS.

During the fall of 1908 locomotive boiler corrosion of a serious nature developed on the Peoria & Eastern division of the Big Four, the writer at the time being in charge of the chemical work for the company.

This division is divided for engine service at Indianapolis, Ind., "west end" engines working between Indianapolis and Peoria, Ill., and "east end" engines between Indianapolis and Springfield, Ohio, except during unusually busy periods, when engines are occasionally transferred for several runs from one district to the other. Engines from both districts, however, run into Moorefield roundhouse at Indianapolis and take water from the Moorefield water softener before leaving Indianapolis on their runs. This softener is a standard, Davidson type, continuous system machine, using lime and soda ash, in the usual manner. It had been in continuous service ten months prior to the first evidence of corrosion troubles, and had served as the exclusive water supply for the yard engines working in Moorefield yards, the stationary boilers at Moorefield shops and roundhouse in addition to the road engines.

The first evidence of corrosion in boilers of road engines was reported on October 8, 1908, in the case of freight engine 6169 on the "east end," which gave up its train on account of a bursted flue. Upon examination this revealed a bad case of pitting and corrosion. Following this experience in rapid succession and extending over a period of several months, engine failures due to pitted flues were frequent, a total of 3,335 flues being scrapped in 1909, and 1,069 in 1910. At about the time of the first case in question, the general foreman of Moorefield shops and roundhouse reported that an occasional nipple or elbow in the feed pipes of the stationary boiler plant, between the feed water heater and boilers, had to be removed on account of being honeycombed by pitting and that this trouble had developed after the installation of the water softener, the pipes previous to its installation becoming limed up badly from time to time. Within a short time after this report, yard engine 6522, which had been in service at Moorefield yards using treated water from Moorefield water softener exclusively, was taken to the division shops at Urbana, Ill., where upon being overhauled it was found that the entire set of flues were pitted so badly that they had to be scrapped. In the light of the above-mentioned cases it is not surprising that suspicion pointed toward the water softener; in fact, it was the only new or unusual thing to be found in connection with the water service.

Upon investigation, by a process of elimination, it was found that the stationary boilers of the Moorefield plant were in ex-

*From Appendix A of the report of the Committee on Water Service of the American Railway Engineering Association. The committee prepared the following introductory note:

"The installation of small pumps to discharge a definite quantity of soda ash, in solution, into water tanks instead of relying upon enginemen to place the soda ash itself in the engine tender is not new, as a number of such outfits are in service for the purpose of relieving conditions where the hardness of water from sulphates occurs at points which are not equipped with softeners or where the conditions would not justify that expense, but the committee believes such an installation for the purpose of preventing pitted flues, as described in this article, is new and it is therefore brought to your attention.

"The committee wishes to point out for the benefit of members who may not have had enough chemistry to fully comprehend the suggestions which would otherwise occur, that the pitting of flues was stopped by maintaining in the boiler at all times water slightly caustic from sodium hydrate, and that control of this causticity was made by continuous chemical examination of samples of water taken from the boilers at the terminal or at points between terminals as may at times seem desirable, this examination being for the double purpose of maintaining no greater causticity than necessary and to furnish data for use in cases of alleged foaming trouble and failure to use blow-off cocks. It is the practice on some roads to secure more effective removal of sludge through blow-off cocks by connecting them to a perforated pipe which is laid on the mud-ring and thus withdraw the sludge from the entire ring instead of only in the vicinity of the cock.

"The control of the boiler waters required to make these caustic soda stations successful can best be made by a chemist and engineer of tests, but railways, suffering from thin traffic as well as bad water and unable to afford the expense of a man to devote his exclusive services to such matters, may be able to find a local chemist familiar with water analysis who would be equipped to do such work."

cellent condition, with no evidence whatever of any pitting or corrosion; that the yard engine in question had been in service at another point where a hard water had been used before coming to Moorefield yards, and that the road engines affected were confined to those which were in service exclusively or most of the time on the "east end." Samples of boiler waters from all engines coming into Moorefield roundhouse were then called for, with the object of noting by chemical examination what difference, if any, existed in the condition of concentrated waters of "east end" boilers as compared to "west end" boilers. These samples were drawn at the water gage in a bucket, allowed to cool, bottled, tagged, dated and forwarded to the laboratory for examination. At the laboratory the examination was conducted as follows:

One hundred c. c. of the sample were titrated with phenolphthalein indicator and normal ten hydrochloric acid, the number of c. c. of acid required being noted and the titration completed with methyl orange indicator. The number of c. c. of additional acid required with this indicator was noted, and also the total number of c. c. of acid required with both indicators. For the purpose of explanation, we will call this operation the first step. Another 100 c. c. of the sample were then taken and 30 c. c. of a 10 per cent. solution of barium chloride added, with phenolphthalein indicator, and the mixture titrated with normal ten hydrochloric acid, the number of c. c. of acid required being noted and set down as the phenolphthalein titration of the second step.

In arriving at results from the above, the following procedure was observed: If the acid required with phenolphthalein indicator in the first step exceeded that required by methyl orange, the difference was charged to hydrates and reported in equivalents as sodium hydrate. The amount of acid required with phenolphthalein indicator in the second step was compared with the amount required with phenolphthalein indicator in the first step. If less, the difference was multiplied by two and charged to alkaline carbonates and reported in equivalents as sodium carbonate. The total acid required by sodium hydrate and sodium carbonate was then deducted from the total acid required by both phenolphthalein and methyl orange indicators, the total alkalinity, and the difference, if any, charged to alkaline earth carbonates and reported in equivalents as calcium carbonate.

In case the acid required with methyl orange in the first step was greater than that required with phenolphthalein, the difference was charged to bi-carbonates and reported in equivalents as sodium bi-carbonate. The second step was then conducted the same as before, the sum of the sodium bi-carbonate and carbonate subtracted from the total alkalinity, and the difference charged to alkaline earth carbonates and as before, reported as calcium carbonate.

The use of hydrochloric acid instead of sulphuric acid in the titration is obvious, on account of the use of barium chloride.

By way of comment on the above procedure, no claim is made for scientific accuracy, because the steps as outlined are not absolutely accurate. They are, however, sufficiently so to serve the purpose to which they were put, and reference for explanation in detail will be found in "Sutton's Volumetric Analysis," under "Titration of Alkaline Salts." Besides the above figures on the samples, we also titrated for the chlorine content with standard silver nitrate solution in the usual manner, save that we first carefully neutralized the sample with nitric acid.

The accompanying table is a transcript of results of laboratory examinations of a few boiler water samples.

It will be noted that the average chlorine content of all waters on the east end is about 1.39 parts per 100,000, and that they do not vary a great deal. Comparing this average figure with chlorine content of east end freight engine No. 6571 boiler water, reported, above as having a chlorine content of 35.2 parts per 100,000, we note a concentration of about 25 times.

Attention is called to this observation for the reason that where the chlorine content of water supplies within a district are approximately the same, by comparing the average figure with that found in concentrated boiler water samples, a figure is obtained which serves as an index to the concentration of the boiler water and may be used to check up engine crews working under instructions as to blowing down of boilers, and to check up roundhouse practice as to washing boilers, changing water, etc.

Concerning the general character of the water supplies of the east end as reported in the analyses above, relating to the corrosion experienced, it will be noted that none of them are acid waters. On the contrary, they are so-called alkaline waters, and two are treated waters, showing, as a result of treatment, a slight causticity. Ordinarily one would not expect to find corrosion following the use of such waters, and with corrosion occurring as it did, with their use, it is quite a temptation to theorize as to the exact cause of the corrosion. By way of comment it may be stated that upon chemical examination of corroded or pitted spots of sections of affected flues, taken while yet moist and before samples had had time to become oxidized, the content of such pitted vesicles contained, according to qualitative analysis, ferrous iron and sulphuric anhydride, while on surfaces of other portions of the sections, alkaline earth carbonates were in evidence, most of the pitted and corroded spots on the cleaner flues being universally on the under or lower side.

In searching for a cause for the corrosion, no attention was paid to the composition of the flues in use, further than to establish the fact that the flues in service on this division were no different from flues furnished on other divisions where no trouble was being experienced in the use of mixed, treated and untreated waters.

Attention should be called to the fact, however, that many of the flues affected, although not all of them, had been in use some time prior to the installation of water softeners at each end of the district, and as a consequence were heavily covered with hard scale, the worst corrosion when appearing in the form of blisters in contradistinction to pitted points, occurring in its most active form immediately under the edge of adherent scale. An analysis of a sample of scale, showed:

	Per cent.
Silica	1.48
Ferric oxide	17.47
Calcium carbonate	9.32
Calcium sulphate	65.92
Magnesium oxide	5.62
Ferrous iron	Trace
	<hr/>
	99.81

Considering the ferrous iron and sulphuric anhydride found by qualitative analysis of contents of pitted vesicles as mentioned, one might theorize that the sulphates of the alkaline earths had been broken down under the influence of carbon of organic matter, high heat, pressure, etc., but in the examination of the water supplies, no organic matter in appreciable quantity was found. Passing by the exact cause of the corrosion, since, under the conditions under which it took place, any explanation would of necessity be hypothetical in its details, the remedy for counteracting and stopping the trouble was based on the information obtained in the chemical examination of the boiler waters of west end engines as compared to those of the east end. The west end boilers giving no trouble and being quite caustic in comparison, it was concluded that if the east end boilers had caustic in some form added by injection into the raw water supplies, thereby keeping the east end boilers slightly caustic due to "hydrates," that the trouble pending the installation of additional standard water softeners, would cease.

This recommendation accordingly went out from the laboratory in December, 1908, and again in January, 1909, but on account of diversity of opinion as to the cause of the corro-

sion, some of the official staff believing that Moorefield treated water was causing the trouble, the use of the caustic was not begun until March 5, 1909. On this date the use of caustic soda at Arcanum, Ohio, water station was commenced, nine grains per gallon, in the form of solution being injected into the delivery line from the large pump discharging into the wayside tank. The apparatus used consisted of a "Gould's Plunger Boiler Feed Pump No. 2," Fig. 485, Fairbanks, Morse & Co.'s catalog 1909, price about \$10, and having a plunger one and a quarter inches in diameter which was attached to the large pump in such manner that it had a stroke of three inches with each stroke of the large pump. This small pump was connected to an iron tank having a capacity of about 200 gal., in which the caustic soda solution was diluted to the desired strength, and discharged into the discharge line of the large pump. It is advantageous to have the line from the small pump enter the discharge line of the large pump as near the tank as possible, on account of the gradual deposit in the pipe occasioned by the interaction of the caustic soda with chemical salts in solution in the raw water.

On May 1, 1909, a similar outfit was put in operation at the Troy, Ohio, water station, where four grains per gallon of caustic soda were used. Following these installations, a passenger engine which had been overhauled at the shops and given an entire new set of flues, was caused to double the district until 28,000 miles had been made, when several flues were removed for examination. There were found to be without any evidence of pitting or corrosion.

During the treatment of these waters with nine grains per gallon of caustic soda at Arcanum and four grains per gallon at Troy, boiler water samples titrated as shown in the accompanying tables.

It is proper to explain that passenger engines on the east end of their runs east, took water at Moorefield water softener, New Castle, Ind., Arcanum, Ohio, and, going west, at Springfield, Ohio, water softener, Troy, Ohio, and Lynn, Ind. This being true, they received a larger amount of caustic soda in proportion to the total amount of water used than did freight engines which used water from all water stations.

It will be noted that out of 59 samples from freight engines, 35 or about 59 per cent. of them showed presence of sodium carbonate and sodium hydrate. Five of them, or approximately 8 per cent. showed sodium carbonate, but no sodium hydrate, and 19 samples, or about 33 per cent. showed sodium carbonate and sodium bi-carbonate.

It was believed at this time, on account of fewer engine failures because of flues, that under this treatment the corrosion was under control. This assumption, however, was likely not true, as it afterwards was demonstrated that the corrosion did not entirely stop until a causticity due to hydrate was maintained practically all of the time.

The treatment of the waters at Arcanum and Troy, in the proportions already stated, was continued until November 1, 1909, when it was reduced one-half on complaint of enginemen that the treatment of the water was causing foaming. It developed later, however, that most of these complaints were occasioned by an effort on the part of the enginemen to protect one of their number who had carelessly allowed the water to run low in a boiler and burned a crown sheet. This reduction in treatment lowered the percentage of boiler water samples, showing the presence of sodium hydrate so much, that the majority of the samples showed the presence of sodium bi-carbonate instead.

Within four months after the reduction in the treatment several engine failures on account of pitted flues again occurred, and on this account the treatment of the waters at Arcanum and Troy was increased on June 10, 1910, to the figures first used, following which a systematic patrol of the district by the road foreman of engines quieted the complaints on the part of enginemen concerning foaming, it being very

clearly demonstrated that these complaints had been greatly exaggerated. Sampling and examination in the laboratory of boiler waters was continued as before, the object being to raise the causticity due to sodium hydrate until all boiler samples showed the presence of at least a slight amount.

This feature was not finally accomplished until a third caustic soda treating station was established at Maxwell, Ind., August 12, 1910, where two grains per gallon were injected into the raw water supply. With this additional installation in operation no more trouble was experienced with samples of boiler waters failing to show the presence of sodium hydrate in appreciable quantities. This point for the third installation was selected only on account of its distance from the other installations. The daily sampling of locomotive boiler waters and chemical examination, as described, was continued for seven months, during which time more than 90 per cent. of all samples showed the presence of 2 to 15 parts per 100,000 of sodium hydrate along with about an equal amount of sodium carbonate.

Under this treatment the corrosion entirely ceased and no more trouble on this account was experienced, neither was there any more complaint of moment on the part of engine crews on account of foaming boilers, the enginemen apparently having learned how to handle the boilers better under the treatment.

It is also worthy of note that under this treatment the boilers became and remained clean and practically free from scale.

To recapitulate, it is desired to call attention to the fact that between November 1, 1909, and June 10, 1910, when the treatment was reduced, with corrosion re-occurring as already stated, that the freight engine boiler waters did not show the presence of sodium hydrate in appreciable amounts with any regularity. They did, however, show the presence of small quantities of sodium carbonate and bi-carbonate. It is desired to emphasize this point because of the fact that only after a sufficient quantity of caustic soda had been added to show an appreciable amount in the concentrated boiler waters, did we succeed in stopping the corrosion.

It is also worthy of note that, in the use of the caustic soda, we at no time used an amount as large as the equivalent of the half-bound carbonic acid of the alkaline earth bi-carbonates in the waters naturally, therefore it must have followed that the caustic soda so used, when injected into the raw waters, became sodium carbonate and that it was finally hydrolyzed within the boiler and partially re-converted into "hydrate." The question naturally arises at this point why sodium carbonate or soda ash would not have done just as well as sodium hydrate, since it is obvious that the latter when added to the raw water first became sodium carbonate and afterwards was in part re-converted by hydrolysis into "hydrate." In our opinion this probably would have been the case, since it is clear that sodium carbonate and sodium bi-carbonate are partially hydrolyzed within a boiler. This point again clearly brought out by reference above to the titration of west end boiler water samples from passenger engines. These samples show from 7 to 18 parts per 100,000 of sodium hydrate along with a slightly larger amount of sodium carbonate and are accounted for only by the fact that, in addition to the treated water taken at Moorefield shops, two raw waters on the west end carry sodium bi-carbonate naturally, one of them about four parts per 100,000 and the other eight parts per 100,000, the presence of the sodium hydrate occurring on account of the partial hydrolysis of same within the boiler during concentration.

In our opinion the features worthy of note concerning the above experience consist in part of the troubles which may follow the installation of standard water softening or treating apparatus, where waters in part only are treated within a district.

Also, in the importance of chemical laboratory examination and control of boiler waters, where corrosion as described is

being experienced, the features of such control aim to maintain within the boilers a causticity due to the presence of "hydrates" in an appreciable amount, and that whether sodium hydrate or soda ash be used, that it be used in sufficient quantity and so distributed that boiler water samples upon chemical examination show an appreciable amount of causticity due to "hydrates." This plan, in our opinion, insures a sufficient treatment to counteract the "permanent hardness" of all waters used, therefore controls ordinary corrosion troubles, and does so without using an undue excess of reagent, thereby guarding against any unnecessary aggravation of foaming troubles, due specifically to excessive treatment.

TRACK APPRENTICES.*

BY J. T. BOWSER,

Chief Clerk, Maintenance of Way, Queen & Crescent, Danville, Ky.
The average section foreman of today is not as efficient as he should be. The higher wages paid in other branches of railway work and in other trades and occupations are causing the number of efficient, reliable men who can be obtained as section foremen to become smaller each year.

The average foreigner has not the qualities which should be required of men in this line of work and the problem of educating them is attended by a great deal more difficulty and expense than with the English speaking track men, as they are handicapped not only by the fact that they must be educated in the English language but also by the fact that the preparation may not be started so early in life as is the case with the man who is raised along the road. The English speaking man is more liable to remain with the road permanently, thus justifying the expense and trouble involved in the preparation for this work.

The solution of the problem lies in making the position of section foreman attractive enough to induce young men of intelligence and reliability to take up this line of work as an occupation for life. This can be done by keeping the wages paid section foremen in just proportion to the wages paid in other branches of railway work and in other trades and occupations, and by making it possible for men to rise above this position should he be of the proper ability.

As to the preparation of the English speaking men the following plan is a good one:

Create the position of "track apprentice." These apprentices should be employed somewhat in the nature of assistant foremen and should be selected from the available supply of track laborers. In cases where the labor is colored or foreign, these men may be procured from outside sources, though it is preferable that they be procured from along the road if possible.

Young men of intelligence and with an ordinary school education should be selected, and should be paid wages slightly in advance of the rate paid to ordinary laborers. These men should be given to understand that they are employed with the view of educating them and making them efficient enough to hold the position of section foremen, and the prospect of promotion to the position of supervisor or roadmaster should be held out to them. They should be given to understand that such promotion will come only through faithful attention to duty, and the development of executive ability.

These apprentices should be placed under the best section foremen on the road and the foremen should be instructed to give them the advantage of their experience in matters pertaining to the work. Apprentices should be changed from one section to another and from section to extra gang at the judgment of the supervisor or officer directly in charge of foremen.

Apprentices should be called into the office of the roadmaster, division engineer, or other division officer directly in charge of maintenance of way and should be instructed in the handling of

reports, correspondence and time books, and should be given at least a rudimentary knowledge of accounting, that is, the relation which the foreman's reports of labor expended and material used, bear to the preparation of the maintenance of way accounts, and the importance of accuracy in such reports should be deeply impressed upon them.

Where conditions will permit, periodical meetings of apprentices should be called. At these meetings they should be instructed by the roadmaster or division engineer in the more intricate problems in connection with their work, which could not be explained to them by the ordinary foreman with whom they may be working.

When, in the judgment of the supervisor, these men are competent to be placed in charge of sections, they should be used to fill temporary vacancies which may occur. They may then be placed permanently in charge of sections. Personal records should be kept so that no apprentice may fail to get his chance, either through accident or through personal feeling on the part of foremen or supervisors. These men should feel that they will get fair and honest treatment and that ability brings promotion.

After these men become foremen they should be watched carefully and those showing the proper ability and the disposition to take advantage of the opportunities offered, should be encouraged to read and study up on matters not only pertaining to their work, but on all subjects pertaining to railway operation. Provision may be made by the management for the further education of these men through a line of reading or study especially prepared or procured for this purpose. Such literature may be passed from one foreman to another so that the expense entailed would be very slight.

By this plan a supply of reliable, efficient and intelligent foremen will be available, who have been made loyal to the road through proper treatment and loyal to superior officers through personal acquaintance. Through the further education of these men as foremen, they will be available for the position of supervisor, roadmaster, or any other position where men of the type may be required.

THE FOREIGN SECTION FOREMAN.*

BY COLEMAN KING,

Supervisor, Long Island Ry., Jamaica, N. Y.

Section foremen are not graduated from schools or colleges, nor can we hire them from a surplus on other roads, as very few if any railways today are making enough American section foremen to supply their own demand. Can we make our own American foremen by inducing the railway company to increase wages sufficient to attract American young men to track work and eventually fill the position of section foreman? It is my experience that we cannot. Where will you find the young American who will take up his shovel, tamping bar or spike maul and work in a gang of foreigners day after day for four or five years in the hope of eventually gaining sufficient knowledge to attain the position of section foreman?

There is therefore only one solution. We must educate the foreigner, whom we now have in our employ to be the section foreman of the future. By foreigner, I mean European, Asiatic or African.

It is certainly no easy task to make a section foreman out of our present foreign laborer. However, many of our foreign laborers have their families here, and their children readily learn the English language and attend our schools. It is my impression that many of the young men of foreign parentage will follow the vocation of their fathers and that on them will greatly depend the means of supply of section foremen for the near future. They have the great advantage of being able to speak the English language and having a minor American school education, the lack of which is the greatest handicap in the progress of their fathers.

*Submitted in the contest on The Section Foreman Problem, which closed April 25, 1912.

*Submitted in the contest on The Section Foreman Problem, which closed April 25, 1912.

HEAVY DRAINAGE WORK ON THE PENNSYLVANIA RAILROAD NEAR PETERSBURG, PA.

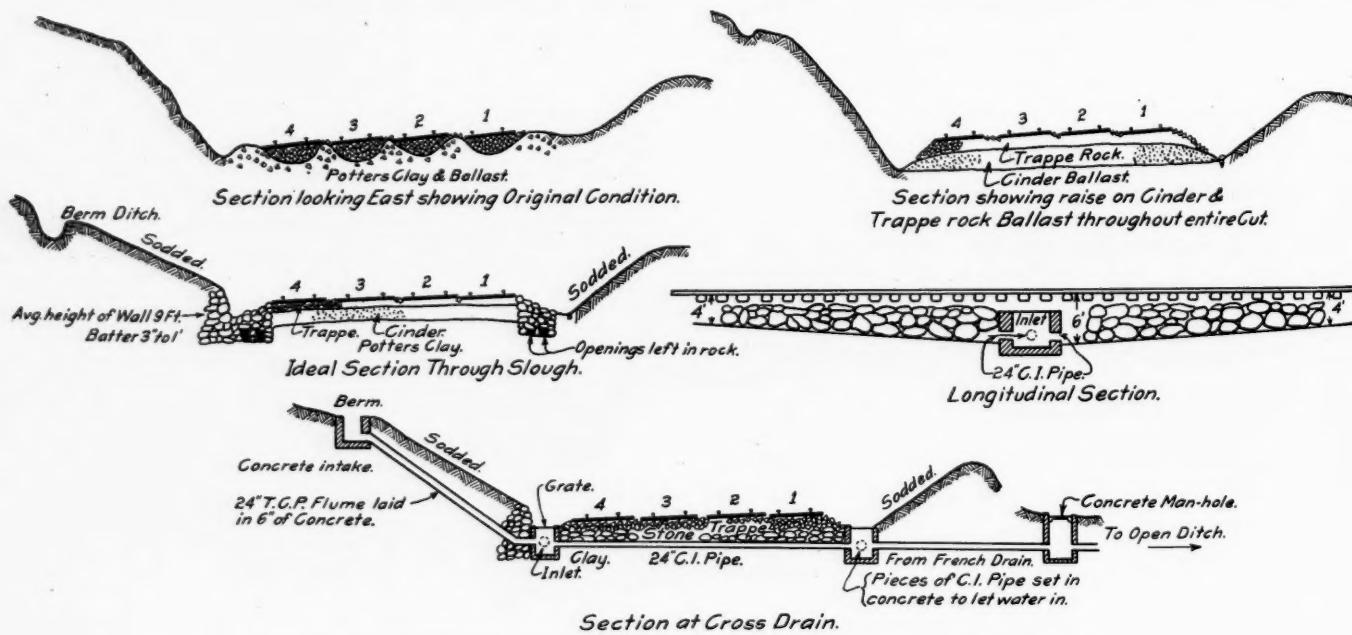
The work of improving the drainage conditions at Neff's Cut, Pa., just west of Petersburg station on the middle division of the Pennsylvania Railroad, is now completed, and on account of the difficulties encountered the remedies applied are of interest. The cut is 2,900 ft. long, and is located on a summit. It passes through impervious potters clay, which was depressed under the tracks by the heavy weight of passing trains and raised in the ditches, requiring the constant employment of a large force of men to keep the tracks in surface and line and the ditches open.

When single track was originally constructed at this point it practically followed the contour of the hill on a 6 deg. curve; this was eventually double tracked. In 1890 the alignment was changed, to a 2 deg. and 30 min. curve, by cutting through the hill. During the revision of alignment incident to the construction of third and fourth tracks a 1 deg. and 15 min. curve was installed, which necessitated a deeper cut. When the line was

prevented. The northern intake of the drain was connected by a covered flume of pipe down the slope of the cut, which drains all the water carried by a berm ditch during periods of heavy rains. As the rainfall is very great it materially assists in keeping main drain well flushed. Where the main drain crosses the side ditches, concrete inlets were installed, also connected by 24 in. pipe on either side with the French drains, which were laid by hand in the side ditches.

Standard ditches and slopes were constructed on either side of the cut, the banks were sodded, and a curb of small stone set along the foot of the slope to prevent scouring which would allow the sod to slip.

On both sides of the track it was necessary to shore up and excavate through the slough, at the ends of the ties, to the depth of from 4 to 6 ft. and 6 ft. wide; the grade at the bottom running toward the main cross drain. These ditches were filled with large stone in such a way as to provide ample openings to allow the water to find its way to the main cross drain. The weight of the stone combined with its thrusts against the slopes prevents the raising of mud in the ditches. It is interesting to note that where the excavation was being made the men



Typical Sections, Showing Methods Applied in Drainage at Neff's Cut.

changed to the second location considerable difficulty was experienced in maintaining line and surface. A ditch was constructed along the north side of the tracks and filled with one and two man stone, thereby giving drainage and arresting the trouble. When the tracks were built on their present location, upon very little sub-ballast and a potters' clay bed, an extra force had to be stationed there to maintain them.

In the early spring of 1909 a survey was made to determine what fall could be had in order to drain the cut, with a view of gradually eliminating the trouble and thereby saving the cost of extra maintenance which had been about \$900 per month.

Following these surveys, the grade was revised and the tracks were raised about 24 in. on cinder ballast to prevent the muck from reaching the surface. After this treatment the tracks were raised on 1 ft. of trap rock ballast.

A 24-in. cast iron pipe under the tracks was lowered to a depth of about 6 ft. below the top of the rail, with a good fall and extended by the use of additional terra cotta pipe, to a point south of the Petersburg branch tracks and thence by an open ditch to the river. Two large concrete manholes were installed along the line of the main drain, with basins about 1 ft. lower than the base of the drain, in order that any sediment from heavy freshets could be cleaned out and the clogging of the drain

had to leave the ditches when trains were passing, as their weight forced the muck and water from the roadbed into the ditch in small streams, as if shot from a force pump.

On the north side of the railway a solid formation exists about half way through the cut, and where the strata of slate and shale end, a heavy retaining wall 2,100 ft. long was constructed to hold back the slopes, which had constantly slipped and filled the ditches. This wall in connection with a large French drain doubly insures against mud raising.

A change of a public road on the north side of Neff's bridge was necessary because of the road being considerably higher than the floor of the bridge. During rains, water ran off the bridge on to the tracks, keeping them wet and muddy. The berm ditch on the old slope was originally carried by a flume on account of the road running parallel to the top of the slope. This flume was frequently undermined and would break, causing water to flow over the banks. The road was moved back and lowered, overcoming this trouble.

Since the completion of this work in August, 1911, it has been possible to maintain line and surface, a standard slope and ditch and to dispense with all extra men, thereby reducing the cost of maintenance of this section by \$900 per month. In addition the annoyance of trains reporting daily "track bad in Neff's cut"

has been eliminated. The life of rail and fastenings has been increased, as prior to this treatment the soft roadbed caused many broken splices, line and surface bent rails and the constant gaging lessened the life of ties.

It is worthy of note that through this cut there are four tracks, two east- and two westbound, over which pass daily 73 passenger trains, hauled by engines mostly of K2 type (192 tons), also 125 freight trains moving 6,900 cars hauled by engines of the heavy H8 type (170 tons), most of the loaded freight traffic passing over No. 2 track. On account of the density of traffic horses and carts were used to remove all excavation, which not only obviated the necessity of work trains and detentions to traffic, but was a great saving in money.

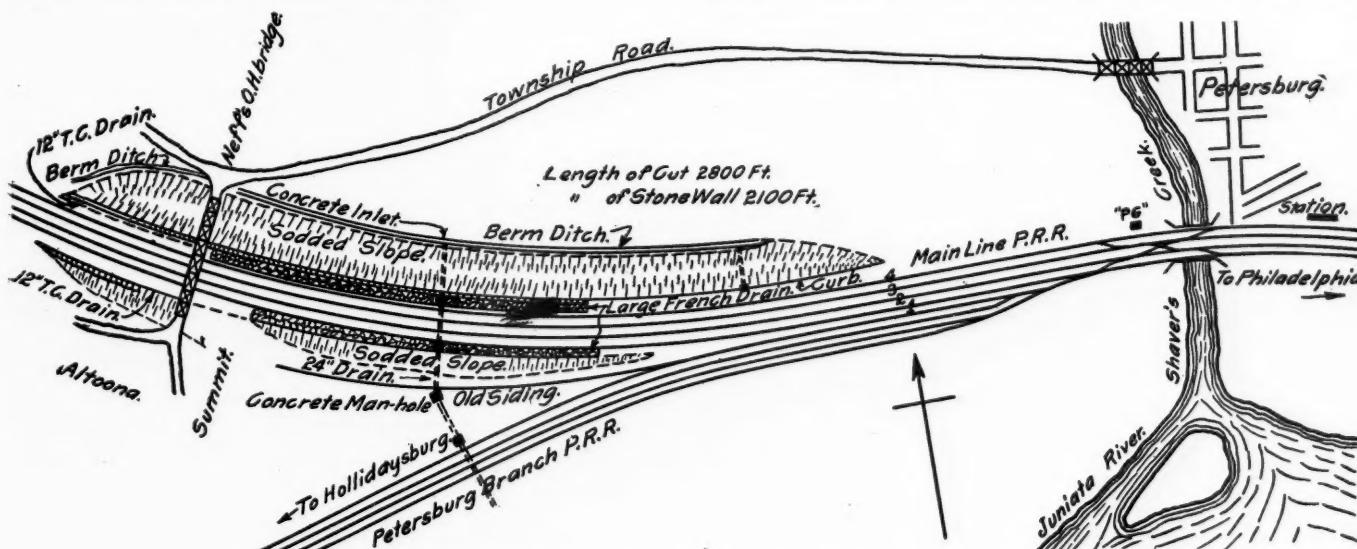
The cost of treatment, which has been taken from our expenses over a period of two years is here given, and while the figures may seem large at first glance, when compared to the extra cost of maintenance, which was over \$10,000 per year, not to mention interruptions to traffic, annoyance to despatchers and the "slow orders" which it was frequently necessary to resort to before this work was done, it is believed that the money is well spent, and best of all, that the treatment is a success.

TRAINING THE FUTURE FOREMAN.*

BY J. F. M'NALLY,

Assistant Superintendent, Atchison, Topeka & Santa Fe, Chanute, Kan.

The officers of maintenance of way departments should exercise great care in selecting young men to become foremen, but if the roadmasters keep in close touch with the young men along their divisions they can always secure enough of them to supply good reliable section foremen. There are a great many young men who seek employment during the school vacation and a roadmaster can usually pick up several of these young men and put them in extra gangs as timekeepers at a salary of \$45 per month, which is better than they can do at any thing else in a small town. If these young men work with an extra gang for two seasons, and have the right kind of material in them, the third year they can be used as assistant foremen. Some of them can be placed in terminal yards, where they have an opportunity to learn track work of all kinds. I find by picking up these young men and giving them an opportunity to learn track work that they make foremen who will stay with us. I have also found that we can pick up young



Plan of Drainage System Installed at Neff's Cut, Near Petersburg, Pa.

COST OF TREATMENT OF NEFF'S CUT.

Cost of large stone.....	\$1,120.83
Cost of terra cotta pipe.....	482.38
Cost of cast iron pipe.....	66.90
Cost of team hire.....	3,009.50
Labor picking up and unloading stone on division (73 flats)	665.21
Labor making standard ditch, sloping, excav., etc... .	7,392.77
Labor building retaining walls and French drains...	1,881.91
Labor changing public road.....	748.38
Labor unloading large stone purchased.....	479.21
Labor installing terra cotta and cast iron pipe....	279.24
Labor cutting and laying sod.....	450.69
 Total	 \$16,577.00

Steam shovel work on the Gold Hill section of the Panama Railroad has been completed. This means that all grading for the relocated line is practically complete, as the portions between Pedro Miguel and Panama and between Gamboa and Colon are now in use. The remainder of the work will consist principally of tracklaying and ballasting and the construction of telegraph, telephone and signal systems. It is expected that the line will be ready for freight traffic about June 1, but passenger trains will continue to run over the present route until the canal is practically completed, as all of the larger inland Canal Zone villages are located on the present main route across the canal channel from the relocated line. The building of the Gold Hill line was described in the *Railway Age Gazette* of February 16.

farm boys 18 to 19 years old, and put them to work on sections at their home towns, instructing the section foreman to encourage them in their work by showing and explaining to them the importance of doing their work in a first class manner. Then when a vacancy occurs for a foreman the roadmaster can use this young man, and if only temporary, it will greatly encourage him.

We pay section foremen in small towns \$60.50 per month, while those handling yards get \$71.50, and we have experienced very little difficulty in securing plenty of capable foremen, for the simple reason that we do not make a change in foremen unless we find it absolutely necessary. On the 680 miles of track of the Southern Kansas division we have 120 sections, and I find that during the last seven years we have made but nine changes in foremen, three of which were due to the promotion of a foreman to the position of roadmaster. Five of our foremen have been in service from one to five years, four for seven years, 20 for 10 years, 12 for 15 years, 19 for 20 years, 40 for 24 years, 10 for 26 years, 6 for 30 years, 3 for 33 years, and 1 for 47 years.

It is true that some of these foremen on the Southern Kansas division will drop out within the next few years and receive a pension of \$20 per month, but we have young men which are learning track work and will be able to take their place; they may not be able to give us as good service the first six months

*Submitted in the contest on The Section Foreman Problem, which closed April 25, 1912.

or the first year as the old foremen have given us, but if they are the proper kind of men and have the proper kind of material in them they will soon make good foremen.

I do not think there is any need to be excited over the scarcity of foremen for the future, if the roadmasters will give young men an opportunity to learn track work. Young men would rather work on the section than to do farm work, as the hours are much shorter and the pay is better.

I do not believe in making a change in section foremen unless it is absolutely necessary, for a foreman should know the weak places in his section, and should know the minute he sees a piece of poor track the best method to follow to build it up and maintain it to a high standard. A new foreman cannot do this. It takes a man from five to six months to get acquainted with all of the weak places on a section and to give them the proper attention.

I have never believed in employing what is known as the "tourist" section foreman any more than I do in employing the tourist brakeman. Within the last few days a young man, about 26 years old, called on me for a position as section foreman. He was a very intelligent looking young man, but I found he had worked for six different railways in the last three years. The only reason he could give for changing was that he did not like his roadmasters. My advice to that young man was to try to hold the next job that he was fortunate enough to get. I believe there are more old section foremen on the Santa Fe system than on any other railway. We have men who feel toward the company just the same as if they owned the track, and I do not believe they could do any more or better work if they did own the track. I believe that if the roadmaster and superintendent will make an extra effort they can arouse this kind of feeling among more of their section foremen.

There are times when a foreman needs encouragement and a roadmaster should not hesitate to give them such encouragement. If he finds the foreman is rendering good service he should not hesitate to show that he appreciates it. If the roadmaster has a man that is not rendering good service he should visit that foreman and talk to him, as it may be possible that he did not understand how the roadmaster desired the work to be done. A roadmaster should talk with his foremen in the same way as he would like his superior officers to talk to him. Never keep lazy foremen. If a track man is out of employment, unless he has had some bad luck there is something radically wrong with him, and a roadmaster should not employ him without first investigating why he is out of employment.

An advantage in training our own foremen is, that if a young man is inclined to have bad habits there is plenty of opportunity to find it out before you promote him to a foreman.

There are a great many ways that a good section foreman can save money for his company. Say for instance that there are 120 foremen on a division. There are certain seasons of the year that these men are renewing ties, and if each one of these foremen were to take out one tie each day that would give one year's service, a great amount of money would be lost. It is the same way with other material, as it is very easy for the foreman to permit his men to loose one or two spikes or bolts each day, but if the right kind of a foreman is in charge this of course will not occur.

I would recommend that all officials in charge of maintenance of way, give a closer attention to track work, as at the present time there is not enough attention given to track work and the foreman proposition.

If the division roadmaster and superintendent will put from one to two young men to work in the yards at a salary of \$1.50 per day or \$45 per month they soon will have plenty of young men to make good reliable section foremen. Why shouldn't we educate young men for track work the same as we do for operators, agents, machinists, etc. I think if the different railways throughout the country would discontinue the hiring of "tourist foremen" and adopt the method of putting young men to work

in their yards and extra gangs that they will have a sufficient number of young men to fill the vacancies for foremen when they occur. There never was a better opportunity for the advancement of young men who have a good education and are not afraid to work than there is in the track department of today.

ABSTRACT OF ENGINEERING ARTICLES SINCE MARCH 15.

The following articles of special interest to engineers and maintenance of way men, to which readers of this section may wish to refer, have appeared in the regular weekly issues of the *Railway Age Gazette* since March 15:

Construction of the Oregon Trunk and the Des Chutes Railways in Central Oregon.—The construction features of the lines built by the Hill and Harriman systems into central Oregon were described in an illustrated article in the issue of March 22, page 680. The building of these lines has been watched with interest by engineers throughout the country both on account of the keen competition between two great systems and the difficulty of railway building in that country.

Construction of the Bingham & Garfield.—A very unusual piece of construction work has been completed by the Utah Copper Company to reach its copper mine in Bingham, Utah. The country traversed is very precipitous and the cost of building the new line was very high, reaching a maximum of \$599,250 per mile. The work was described and illustrated on March 29, page 744.

Bridge Construction on the Oregon Trunk Railway.—The Celilo bridge on the Oregon Trunk is an unusual structure in its location and manner of erection. In addition to this bridge, there are on this line two important crossings of the Des Chutes river and a 340-ft. arch span across the Crooked river. The special features of these bridges were described in the issue of March 29, page 756.

Rail Breakage and Wheel Loads.—The series of editorials on the rail problem was continued in the issue of April 5, page 785. This editorial called attention to the relation of rail breakages to wheel loads and showed that rail sections have increased in proportion to wheel loads and that the majority of breakages indicate defective material rather than excessive loads.

"Engineering as a Vocation."—A review of this book by Ernest McCullough was published on April 5, page 787. The book is intended for young men contemplating engineering as a profession and contains a great deal of the personal experience of the author.

Union Station and Grade Separation in Joliet.—The problem of providing facilities for handling the passenger business in small cities has become very important in many cases. It has apparently been solved by the roads entering Joliet, Ill., where all tracks in the business district have been elevated and a new union station is nearing completion. The design of the station and the details of the subway work and track elevation were described in an illustrated article in the issue of April 5, page 789.

The Construction Outlook.—The prospect for general construction work and the principal large projects contemplated during the coming season were discussed in an editorial in the issue of April 12, page 830.

Twin City-Twin Ports Line of the Soo.—The Minneapolis, St. Paul & Sault Ste. Marie has completed a section of 73 miles from Frederick, Wis., to Superior, which provides that company with a direct line between St. Paul-Minneapolis and Superior-Duluth. The peculiar difficulties of construction in that portion of the country and the erection of two steel viaducts and a heavy timber crossing of the Great Northern were described and illustrated in the issue of April 12, page 842.

Memphis Union Station.—The station building which has recently been occupied at Memphis, Tenn., is not exceptionally large, but is provided with every facility. A description of the building and terminal was given in the issue of April 12, page 852.

The Development and Use of Rails.—At hearings of the Indiana railway commission P. H. Dudley, consulting engineer of the New York Central Lines, discussed very completely the growth in the use of rails from the earliest strap iron and wooden girders to the present heavy steel sections. An abstract of these papers appeared on page 948 of the issue of April 26.

The Hudson Bay Route.—A discussion of the need for, and the proposed route of, the new Canadian railway to Hudson Bay was published in the issue of April 26, page 960.

Northern Central Station at Baltimore.—A number of photographs of the station recently completed by the Northern Central at Baltimore and a short description of the general features of the building appeared in the issue of April 26, page 964.

Grade Separation at Grand Crossing.—The elevation of tracks and separation of railway grades at Grand Crossing on the south side of the city of Chicago involved very heavy work which required a long period for its completion and attracted considerable attention throughout the country. The preliminary track elevation, the development of the grade separation plans and the details of the construction work involved in elevating the

tracks and building the numerous subways on the four roads interested, were described and fully illustrated in the issue of May 3, page 990.

Study of a Broken Rail on the New Haven.—The management of the New York, New Haven & Hartford has had a careful examination made of the rail which caused the wreck of the Federal Express on February 11 near Leet's Station, Conn. It was found that the structure of the rail on the inside was quite different from the outside and it was concluded that this difference must have existed when the rail was delivered from the mill. A number of the photographs taken of the rail and etched cross sections were reproduced with the article regarding it in the issue of May 3, page 1012.

Two editorials on the rail question appeared in the issue of May 10. One, on page 1030, commented on the increased inspection of rails at the mills, which was described more fully on page 1057 of the same issue in outlining the program of inspection adopted by Robert W. Hunt & Company, who have for many years represented a large number of railroads as inspectors at the mills. The other editorial discussed the relation of flat wheels to broken rails, showing the various conditions of wheels which may be responsible for breakages of comparatively sound rails.

Proceedings of the Thirteenth Annual Convention, American Railway Engineering Association. The new Proceedings of this association were reviewed in the issue of May 10, page 1034.

The Florida East Coast Extension.—One of the most interesting pieces of engineering construction undertaken in recent years is the extension of the Florida East Coast railway from Miami, Fla., across the keys to Key West. This project has attracted the attention of engineers and the public throughout the country and has been widely advertised as the "railway over the seas." The construction was divided into three classes, the grading across the Everglades on the mainland, the grading across the keys, and the bridge work between the keys. Concrete arch viaducts were used extensively and in the deeper water steel girders or truss bridges were provided. The problems connected with this work, were, on account of its peculiar location, numerous and required some interesting solutions. All of these details are fully described and illustrated in an article appearing on page 1036, the issue of May 10.

A SMALL STATION ON THE TOLEDO, PEORIA & WESTERN.

The Toledo, Peoria & Western has built a small station at Secor, Ill., which has some unique features. The exterior finish is brick veneer, with stone trimmings and slate roof. The platform shown in the accompanying photograph is a temporary one and will be replaced with one of concrete. The interior is divided between a waiting room, ticket office and baggage room. The ceiling and walls above the wainscoting in the office and waiting room are finished with a prepared wood fiber product called "beaver board." The company has experimented with this



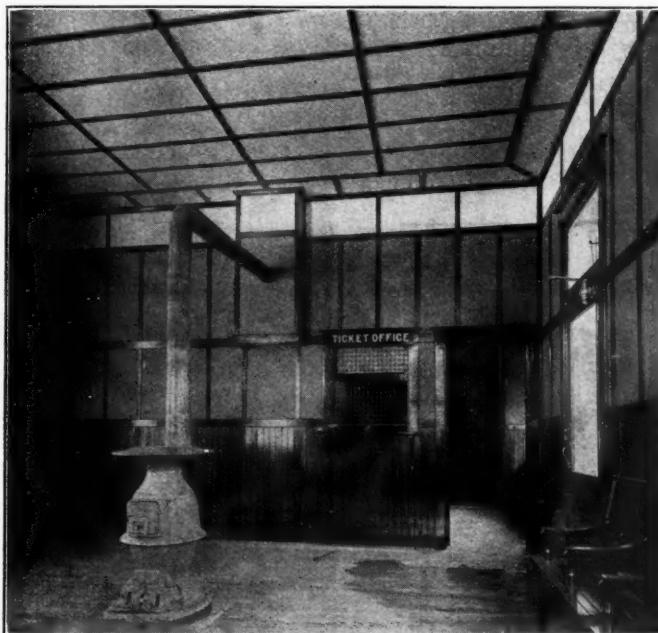
Brick Veneer Station; Toledo, Peoria & Western.

material on two stations, and so far the results have been very satisfactory.

The beaver board replaces the lath, plaster, and wall paper, being nailed directly to the studding with nails $\frac{3}{4}$ in. long, having a thin, flat head. It is made of wood pulp pressed into sheets $\frac{3}{16}$ in. thick, which can be cut into panels of convenient size. The joints between the panels are covered by decorative strips and the panels can be painted to secure very pleasing effects. A finish of two or three coats of flat tone paint applied

over sizing has been found to give the best results. It has also been found advisable to paint and size the backs of the panels before they are applied to keep out dampness and prevent warping. At points where there is danger of furniture or other objects striking the wall or being pushed through the panels, the beaver board can be backed up between the studding with a very cheap grade of lumber.

Since plaster finish is not advisable for stations, except when covered with painted canvas or heavy muslin, the cost of such work is high. The common finishing material, beaded ceiling lumber, is constantly becoming more expensive, and it has the disadvantage that it shrinks badly, leaving cracks which are un-



Waiting Room of Toledo, Peoria & Western Station at Secor, Ill.

sightly and which destroy the effectiveness of the wall as a protection. Beaver boards has at least 25 per cent. less joints than a finish of ceiling lumber, and all joints are over the studding and are covered by decorative strips. The cost of beaver boards was estimated in this case to be at least 25 per cent. less than either of the other styles of finish, and so far as experiments have been carried its permanences seems unquestionable. This station has been built under the supervision of J. H. Markley, master of bridges and buildings, to whom we are indebted for this information.

THE FOREMAN PROBLEM.*

BY WILLIAM E. BOHL,

Section Foreman, Atchison, Topeka & Santa Fe Ry., Belpre, Kan.

My idea is for the railways to distribute over their lines a number of young men under good practical foremen at pay that will make the work interesting to them. If they make good they should be promoted to foremen. I do not believe in foreigners for foremen, and think that the United States can furnish enough men if we take as much interest in our boys as we would be compelled to take in training foreigners for foremen. I find that it takes a great deal of time and trouble to make even good section laborers out of foreigners to say nothing about foremen.

A foreigner would rather work for an American foreman than for one of his own nationality. He would rather go three steps to cover up a tray spike or bolt than to take one step

*Submitted in the contest on The Section Foreman Problem, which closed April 25, 1912.

toward the scrap bin. You cannot trust the Italian, Mexican or Greek for anything. He will make a very good track laborer, but from my experience I would say that he will never make a good track foreman. Teach our boys and give them a chance and the foreman problem will be solved.

LOADING RAILS WITH AN AMERICAN DITCHER.

The Southern Pacific has recently relaid many miles of track on its coast division with 90-lb. rails. After the completion of the new track the old rails, second-hand tie plates, angle bars, and scrap, were picked up by a work train, an American ditching machine which was not otherwise engaged at the time being used to pick up and load the rails.

The work train carried empty flat cars with board sides; one for scrap tie plates, bolts, nuts, etc.; one for good second-hand tie plates; and one for angle bars, in addition to the rail cars. Four men were sent out in advance of the train to classify and assemble the small material into piles, so that four men could quickly load it on to the respective cars. The ditching machine which was used had a 24-ft. derrick arm and was arranged to revolve on a circular track which was set on a truck that traveled over a track on a flat car.

A special rail tong was made by cutting off the horizontal handles of an ordinary rail tong and forming rings at the points



Loading Rails with an American Ditcher on the Baltimore & Ohio.

where the tongs formerly joined the handles. These rings were connected by a 3-ft. bridle chain having a ring in its center, into which was fastened the end of a $\frac{3}{8}$ -in. chain 6 ft. long. The opposite end of this chain was hooked over the middle tooth of the ditching bucket, so that when loading a rail the pull on the bridle chain resulted in the tong engaging the rail.

There were several different orders for loading. One order would call for 30-ft. rails in good condition, with or without angle bars on the same car, another for so many lineal feet regardless of rail lengths, another for curve worn rail, and another for short lengths, etc. There were also a few cars of 90-lb. rails to pick up, left over after the new track was completed. Separate cars were provided for the old switches and frogs. Rather than travel the machine on the car it was found more desirable to load one car at a time. The system was as follows:

Two men kept in advance of the train measuring the rails, and marking with red crayon the length of each rail at its exact center. It was found to effect a saving to pick up on only one side of the track at a time. Two men were provided on the ground alongside the car which was being loaded. One of these men clasped the tongs on the rail at the red mark at its center, and the other held the end of the rail to guide it as the derrick arm swung to position over the car. Two men on the car, one at each end of the rail, guided it into place. The section foreman, who had charge of the work, recorded the rail according to the length

which was marked. The man on the ground whose duty it was to guide the rail, also threw the angle bars on the car if the order required them to be loaded with the rail. Every second layer of rails, of course, was inverted, and they were therefore picked up upside down. The man on the ground who clasped the tongs on the rail advanced as soon as the tongs were caught, and inverted the next rail with a pinch bar, so that it was ready by the time the car was opposite. In addition to this force of seven men whose duties were directly connected with the railroading, there were the engineer and the fireman of the ditching machine.

After the men became accustomed to the work the train did not always have to stop at each rail, as it was possible to pick them up while moving slowly forward. An average of 400 rails a day was loaded, while 300 was the average with a gang of 20 laborers. A great deal of time was necessarily lost in clearing for main line trains. This time was utilized in having the men sort and pile the material and scrap on the cars, also in breaking the joints on the old rail in advance of the train.

Assuming the cost of the work train as a constant factor, as is also the labor required in picking up scrap, etc., and charging against the rail loading only the work which was actually used to handle it, including that of the ditching machine and its crew, fuel, wear and tear, interest, etc., the items of cost appear as follows:

Foreman	\$3.00
7 laborers at \$1.60.....	11.20
Ditching machine as above, approx.....	15.00
	\$29.20

Dividing \$29.20 by 400 rails gives a unit cost of 7.3 cents per rail, or 16.5 cents per ton.

With the all labor method the cost is

1 foreman	\$3.00
20 laborers at \$1.60.....	32.00
	\$35.00

Dividing \$35 by 300 rails the unit cost is 11.6 cents per rail, or 26.2 cents per ton.

Loading by the machine therefore gained 60 per cent. in efficiency, secured a more uniform loading on the car, and obviated the likelihood of more or less damage to the ballast caused by 20 men trampling it. We are indebted for the above information to A. B. Allen, assistant roadmaster, Southern Pacific, who was in charge of this work.

The Chicago Great Western has also used a similar machine for loading rails with excellent results. There were loaded an average of five cars containing 120 30-ft. 60-lb. rails each per day, making 600 rails or 160 gross tons. The estimated cost of this work was as follows:

Work train, including crew, fuel, etc.....	\$35.00
Loading crew, 1 engineer at \$125.00.....	4.17
One fireman at 75.00.....	2.50
One foreman at 75.00.....	2.50
Five laborers at .15.....	7.50
Total	\$51.67
Average total cost per ton, \$0.32.	

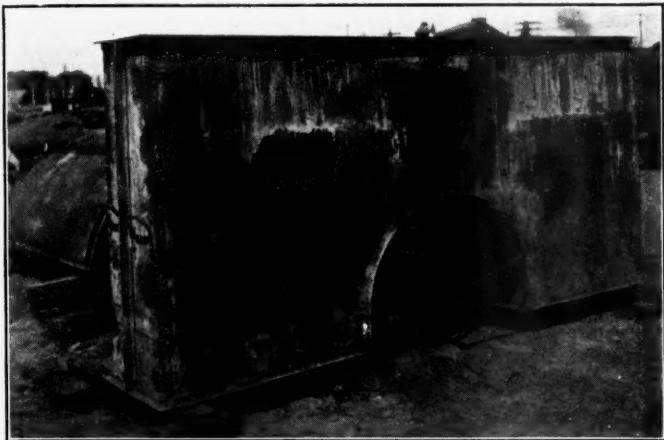
Eliminating train service, which would be necessary with any method, the cost was 10.4 cents per ton. In another instance on the same road a gondola car loaded with ninety 33-ft. 100-lb. rails was unloaded in one hour, the rail being placed on either side of the track in proper position for laying.

The accompanying view shows this machine in use for unloading rails from a gondola car on the Baltimore & Ohio, where it was also used. One important advantage of the use of such a machine is that the rails can be placed on the shoulder where needed and are lowered to the ground without damage instead of being dropped. They can also be spotted in the position desired for relaying and save consequent shifting.

The government of Nigeria is considering the advisability of building a new branch line from Minna to the new tin district of Jemaa. This line has been favorably reported on by the governor of Nigeria and by the chief government inspector of mines.

NEW IRON FORM FOR CONCRETE ARCHES AND PIPE.

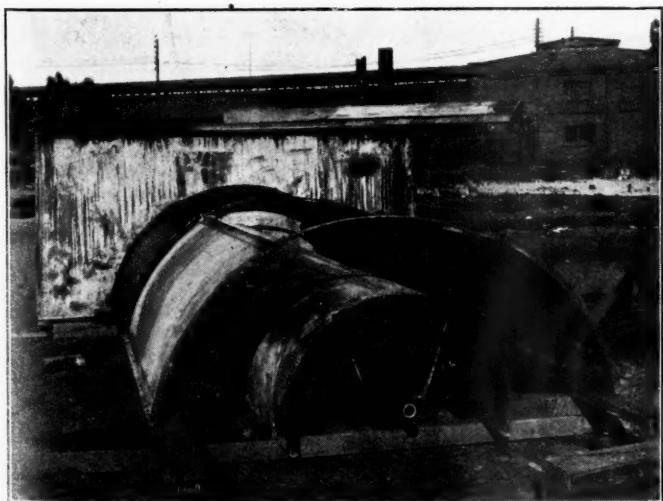
The Southern Pacific has recently completed testing a new collapsible iron form for concrete arches and pipe. The form is made of No. 20 gage iron in 8 ft. lengths, and is of such weight that two men can handle all the pieces for a 36-in. iron form. The form reduces in size by means of a number of eccentrics mounted on a pipe shaft passing through the center of the form as shown in the illustrations. These eccentrics are connected with the sides of the form by iron straps and move the



End View of Collapsible Iron Form, Showing the End Portal in Place.

sides in or out, as the central shaft is turned. They will not move by weight and can only be moved when the shaft is turned, for which purpose an 8-in. wrench is used.

The actual cost of a culvert constructed in this way is but little below the cost where concrete pipe is used, but, considering the loss in concrete pipe due to breakage in shipment and handling and the waste in wooden forms, the arch has been found to be the cheaper. The construction of the continuous culvert and head walls also eliminates the possibility of the joints pulling apart under the fills, which is one disadvantage



View of Collapsible Form for Concrete Arches, Showing Eccentric Shaft.

of jointed pipe. The following figures give a comparison of the cost of two culverts of the same size, in one of which pipe was used, and in the other an arch was built. Both culverts were 36 in. in diameter and 22 ft. long. The cost of excavation and back filling was omitted in both cases.

PIPE CULVERT.

7 joints concrete pipe.....	\$6.00	\$42.00
½ car concrete gravel	4.00	2.00
8 barrels cement	1.70	13.60
200 ft. B.M. form lumber.....	14.00	2.80

Total material \$60.40

Unloading material and building forms and concrete platforms \$22.00

Placing pipe in trench..... 7.50

Placing 8 yds. concrete in portals..... 29.12

Total labor \$58.62

Grand total \$119.02

ARCH CULVERT.

16 barrels cement	\$1.70	\$27.20
2 cars concrete gravel.....	4.00	8.00

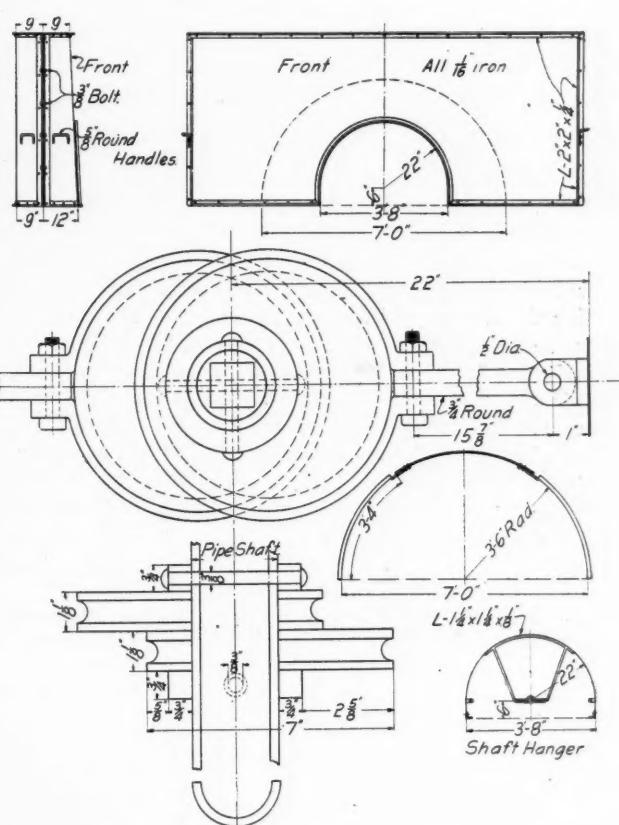
Total material \$35.20

Unloading material and building platform to mix concrete \$19.75

Placing forms and concrete..... 58.25

Total labor \$78.00

Grand total \$113.20



Collapsible Concrete Form.

We are indebted for this information to C. F. Green, supervisor of bridges and buildings of the Southern Pacific at Sacramento, Cal., under whose direction this form has been developed.

FROG AND SWITCH REPAIR OUTFIT ON THE SOUTHERN PACIFIC.

The Southern Pacific has maintained a frog and switch repair outfit, consisting of a work car and a flat car with working tools, including a forge, mandril, drill press and a supply of different sizes of nuts and bolts, on the southern district for several years. The flat car carries all the necessary rivets, plates, bolts and other light material, together with new frogs for temporary replacement; and the crew consisting of one blacksmith and a helper, is thus able to make all light repairs to frogs and switches on the line. When removing frogs from the track or doing other heavy work the track gang is called on for assistance as needed. The crew is under the direction of the district roadmaster on

the line where it is working, and travels from place to place over the division.

In 1909 records were kept of the cost of this work on the road. In the Saugua district, from Los Angeles to Mojave, the crew repaired 13 frogs and tightened 70 switch stands at an average cost per mile of \$1.70. On the Tehachapi district 56 frogs were worked over, the bolts were tightened on 27 switch stands and new rods were substituted when needed, at an average cost of \$2.20 per mile. Similar work on the Bakersfield showed an average cost of \$2.50 per mile. On the Fresno district of 153 miles 55 frogs and switch stands were repaired and put in shape at an average cost of \$1.40 per mile.

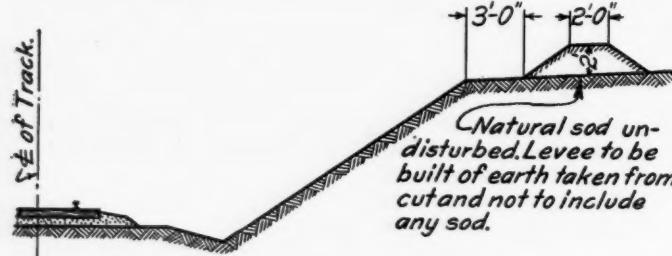
BERME LEVEE OR DIKE.

BY A. A. SCHENCK,

Engineer Maintenance of Way, Chicago & North Western, Omaha, Neb.

The ordinary berme ditch dug above the top of the slope of a railway cut is a serious objection in that it facilitates the soaking of water into the material and frequently causes a sloughing down of the material into the cuts. As this broken surface dries it tends to crack more than ordinarily, allowing still more water to get into the ground and increasing the sloughing tendency. The frost action is also increased by the broken condition of the ground. Beginning with a very small amount of trouble, slipping of the material frequently increases until large amounts of the ground above the cut start to slide in.

When there is an underlying stratum of hard material the water soaks down and moistens the top of this stratum, increasing the tendency of the overlying mass to slip into the cut. When the writer was appointed engineer of the Oregon Railway & Navigation Company's line in 1883 he was at once sent to Cascade Locks to make an examination and report on a slide. It was found that this sloughing tendency had broken the entire surface of an overlying mass of great depth and extended down



Location of Berme Levee with Reference to Center of Track.

to the smooth rock. The masses, in some cases, were the large part of an acre in size and cracks were many feet wide. At certain times of the year when the water reached the surface of the underlying rock and lubricated it, the entire slope for many hundred feet drifted toward the railway and the Columbia river. It is manifestly impossible to resist any sloughing tendency which has reached such a size. In general, the inability to secure any firm base from which to create a counter pressure makes it impracticable to stop this movement. Piling has only a small amount of resistance, owing to the usual depth of the slipping material and its great leverage against the small amount of the pile that is stable below the plane of the slipping.

It is desirable to prevent at the very outset the possibility of water getting into the ground and starting such an action. Where there is a natural sod this makes an exceedingly valuable protection against the entrance of the water into the ground and it is desirable not to disturb this natural covering by the construction of berme ditches.

On the extension of a western road the berme levee or dike which is shown herewith is being tried. These dikes were built without disturbing the natural surface of the ground in

any way by dumping one wagon load of material from the cut in each wagon length of dike. A uniform finish was readily secured by dragging a Fresno scraper along each side and the top of the dike a couple of times. Where any stream of water tended to reach this dike the bottom of the water course was filled to the level of the ground in the lower direction and the dike made much larger, so as to divert the water parallel with the cut. It is of course necessary to place the dike some distance back from the slope of the cut, particularly where the slope is steeper than the angle of repose of the material composing the cut. This dike construction gives greater waterway area for any given amount of material than is the case with the berme ditch and provides a greater allowance for the deposit of sediment.

A QUICK METHOD FOR REPAIRING A WASHOUT.

The breaking of the Black River falls dam near Winona, Wis., on October 7, 1911, caused the flooding of about four miles of track on the Madison division of the Chicago & North Western south of Winona. At one point between bridges about 150 ft. of the embankment was carried away to a depth of 2 to 8 ft. below the ties, and water poured through the opening so swiftly that timbers could not be placed to block up under the ties. As the water was not deep enough to drive a pile bridge and cut off the piles low enough to place standard caps and stringers below the ties, a special construction had to be adopted. The ties were blocked up from both ends of the washed-out section as far as the current of the stream would allow and the remaining section was carried on two-pile bents driven 5 ft. apart, the piles being as nearly under the rails as it was possible to drive them. The track was then jacked up and carried on second-hand bridge stringers 8 in. x 16 in. x 12 ft., supported longitudinally over the piles. This offered a support which was solid enough to run cars on from which to dump material into the opening. It required 44 carloads, or about 1,320 yds. of cinders, gravel and crushed rock, to replace the embankment which had been washed away. In 14 hours after the washout the track was ready for trains, but as the roadbed was very soft, trains were not run over it for 24 hours. We are indebted to M. Riney, foreman of bridges and buildings, for the above information.

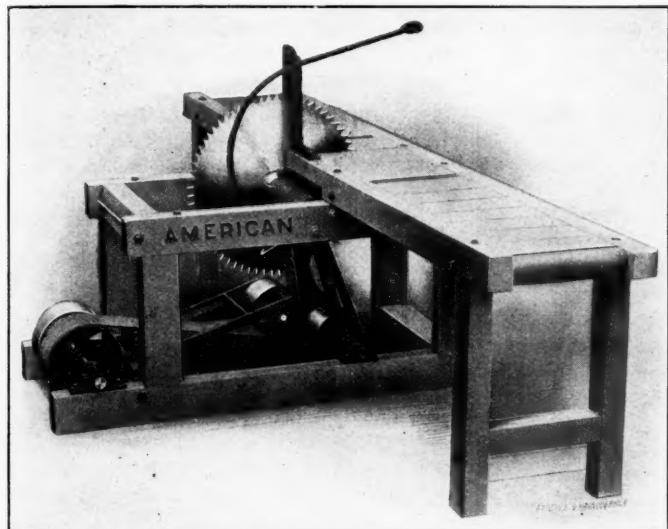
ECONOMICAL HANDLING OF HEAVY MATERIAL

An economical method of handling frogs, rails and other heavy material where forces are limited is used by Roadmaster D. C. Davis, of the St. Louis & San Francisco, at Pittsburg, Kan. In yards especially a considerable amount of material has to be handled with forces of from two to four men. A frog or rail that is to be moved is thrown in the center of the track by bars and a push car is run over it. A piece of light rail is laid lengthwise over the car and chains are thrown over each end of the rail under the frog or rail to be moved. The latter is raised with bars and the chains are fastened up, swinging the weight under the car without any heavy lifting. The push car can then be moved down the track to the point where the frog or rail is needed. In this way heavy material can be moved by two or three men, when four to six would be required to lift it on to a car. There is also no danger of injury to the men by allowing the frog to drop. The only material required is two short chains and a short piece of rail or timber a couple of feet longer than a push car.

A plan has been submitted to the Brazilian government for the construction of a railway from Rio de Janeiro to Valparaiso, Chile.

POR TABLE SAW MILL FOR RAILWAY PURPOSES.

The extended use of secondhand timber and piling offers a profitable field for economy in bridge maintenance. With the development of a portable sawmill which can be readily transported from place to place it will be practicable to resaw much material to eliminate the damaged or decayed portions where previously the entire piece has been thrown aside or burned. The replacement of a trestle with a permanent structure releases a large amount of material which, after sawing, may be suitable for further service. Likewise, piling too short for driv-



American Cut-Off Saw Table.

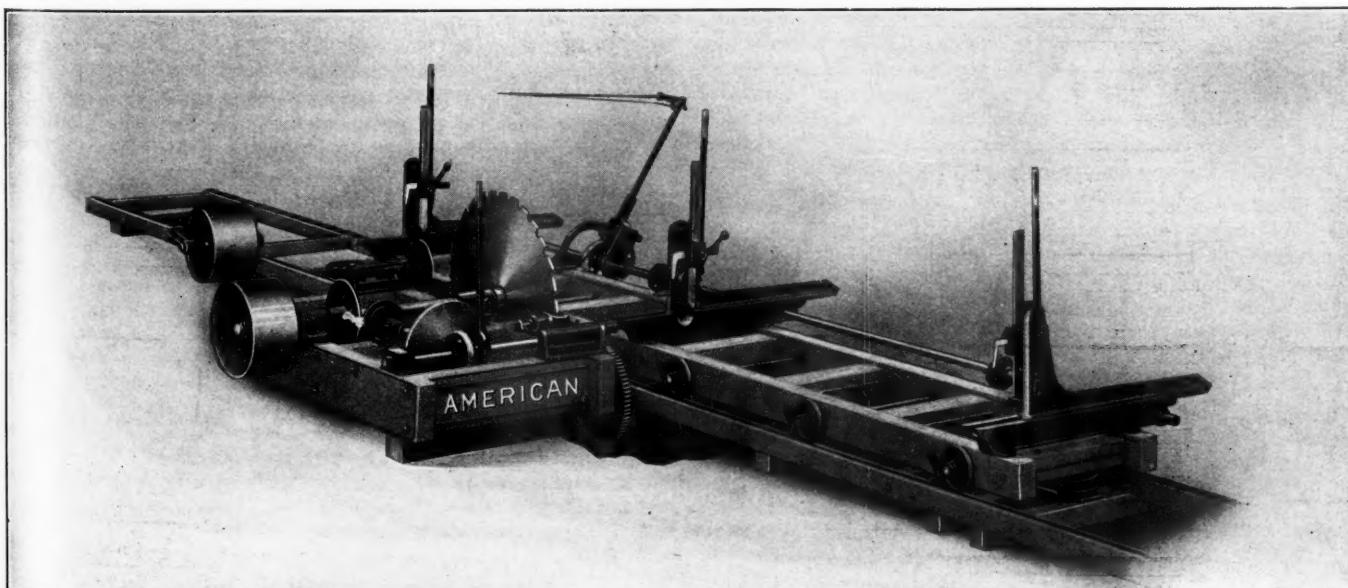
ing again will furnish ties or lumber. Much material suitable for platforms, sheds, fences, etc., can be secured by resawing at the cost of the sawing alone. The portable saw mill made by the American Saw Mill Machinery Company of Hackettstown, N. J., is adapted for this class of work. The outfit consists of a saw mill and a cut-off saw table, which are mounted separately and can be operated independently, and a gasoline engine. The three units are of such size that they can be loaded and unloaded from a flat car readily, so that the saw can either be operated on the car or unloaded at the work as desired. Where any considerable amount of bridge work is to be done in one

vicinity the saw can be located to good advantage at some central point where the timbers from the various places can be brought in and worked over. On a large job it would probably be economical to place the saw at this one location. Such an outfit is capable of wide application in the railway service beyond resawing bridge timber. It should prove valuable in the storage lumber yard to saw odd sizes as required by requisitions. A road owning timber land could also cut its own lumber as required with such an outfit.

LIME WASH FOR FIRE PREVENTION.

On the line of the Hartford, Providence & Fishkill Railroad, built in 1851-55, from Providence, R. I., to Waterbury, Conn., all frame structures were heavily coated every second year with quicklime or common whitewash. This practice was followed for a period of about 25 years after erection and the losses from fire was very small. About 1880 this practice was discontinued, with the result that the fire loss was greatly increased. Some of the Howe trusses on this line were in actual use for more than 50 years, during which time they required very little renewal of timber. During a part of this time, however, they were reasonably well protected from the weather by housing. In presenting these facts to the American Railway Bridge and Building Association, J. B. Sheldon, supervisor of bridges and buildings of the New York, New Haven & Hartford, expressed the opinion that if all frame bridges were heavily coated with lime wash every two or three years fire risks would be greatly reduced and the expense would be very small. He also considers lime wash one of the best of wood preservatives, possibly excepting creosote oil and a few other pressure processes.

The report of the United States consul at Winnipeg, Man., calls attention to a resolution adopted by the Saskatchewan legislature on February 19, 1912, calling upon the Dominion government to abolish the duty on steel rails until the Canadian manufacturers become able to meet the demand. One member stated that the Canadian mills were 37,000 tons behind in their orders. The rapid development of western Canada has made it impossible for the mills to keep pace with the demands and the amount of construction work done is dependent upon the ability of railways to secure the necessary rails. The duty on steel rails imported from the United States is \$7 per ton, and from the United Kingdom \$4.50 per ton.



American Variable Friction Feed Saw Mill.

General News Section.

The name of the Buffalo & Allegheny Valley Division of the Pennsylvania has been changed to Northern Division.

During the week ended May 10, the Grand Trunk ran west from Montreal nine special trains, carrying 2,225 passengers, who had arrived at Canadian ports by steamship from Europe.

The lower house of Congress has adopted by a large majority the amendment to the general appropriation bill abolishing the commerce court and turning its business over to the district courts. The conservative republicans contested this action with persistence, but without success.

The New York State Public Service Commission, First district, has awarded the contract for building section 14 of the Lexington avenue subway, New York City, to Arthur McMullen, New York, for \$3,889,775. This section lies mostly beneath the Harlem river, and the tunnel will consist of four tubes incased in concrete.

At its meeting this week, the committee representing the managers of eastern roads decided to defer action on the demands made by the locomotive firemen pending replies to a letter to be sent by the committee to the officers of all the roads involved, asking if they wish to deal collectively with the firemen as to these demands, or if each road would prefer to deal with its firemen by itself.

The committee of the House of Representatives has continued at Washington the past week its inquiry into the charges of improper conduct which have been preferred against Judge R. W. Archbald, of the commerce court, but not much progress has been made. President Baer, of the Philadelphia & Reading, and several officers of the Lehigh Valley have been called upon to give testimony.

In charging the Mercer County grand jury Supreme Court Justice Trenchard of New Jersey has called attention to the recent charges that Senator Richard Fitzherbert had attempted to mulct the Commercial Acetylene Company of New York for stopping legislative action on two bills aimed to destroy the firm's business in New Jersey. This charge was commented on in the *Railway Age Gazette* of February 23, page 326.

The list of bills before Congress to provide for a parcels post has been increased by the addition of one presented in the Senate this week by Mr. Bourne, of Oregon. Senator Bourne proposes a list of rates to be varied with distances and would have a limit of 11 lbs. For 50 miles he would charge for the first pound 6 cents, and for each additional pound 3 cents; for 500 miles 8 cents and 4 cents; for 2,000 miles, 12 cents and 10 cents.

Three more railways have arranged with Robert W. Hunt & Co., for increased inspection of rails during the process of manufacture, in accordance with the plan described in the *Railway Age Gazette* of May 10, page 1057; namely, the Chicago, Burlington & Quincy, the Chicago Great Western, and the Wabash. With these additions the aggregate length of the railways adopting the new plan will be about 103,000 miles.

In an address before the convention of the Southwestern Postal Association, at Kansas City, on May 10, Joseph Stewart, second assistant postmaster-general, said that during the present fiscal year there have been no deaths on mail cars from accidents. In the corresponding period of the previous year there were 12 fatal accidents in mail cars. The improved condition, he ascribed directly to the increased use of steel cars.

In the House of Representatives at Washington, on Tuesday of this week, the Clayton anti-injunction bill was passed by a vote of 244 to 31, the galleries at the time being occupied by prominent labor leaders. The bill forbids courts to issue injunctions without notice to the parties affected; makes injunctions in certain cases effective for seven days only, forbids injunctions against persons not named, and legalizes "peaceful boycotts."

Operation on the Rock Island lines on Friday, May 10, was affected by a variety of weather conditions. There was a snow storm near Calhan, Colo., and a dust storm driven by a 30-mile

an hour wind at Gem, Kan., which piled sand so high in several cuts that it was necessary to send for a gang of workmen to clear the track. At about the same time there was a washout at Smith Center on the Nebraska division that cost the company \$6,000.

The safety committee of the Delaware, Lackawanna & Western reports that dangerous conditions have been done away with in more than a thousand instances—in such cases as too little clearance for cars, holes along the roadway, and low bridges. Of the 153 men injured on the road during the month of April, 94 were employees working in shops, roundhouses, and other places not directly connected with transportation. The number of fatalities has been much smaller this year than last.

The budget of the St. Louis & San Francisco for improvements to be made this year includes an appropriation of \$270,000 for new ballasting; \$160,000 for new stations, not including the station in Springfield, Mo., for which plans are being prepared and which will cost between \$300,000 and \$400,000, and \$250,000 for bridge replacement. Orders will be placed for 30,000 tons of 90-lb. steel rails, and it is planned to double-track 80 miles a line between Kansas City, Mo., and Ft. Scott, Kan.

The anthracite miners, in convention at Wilkesbarre, Pa., are considering in great detail the proposed new rates of wages, and it is conjectured that an agreement with the operators will be reached, but nothing conclusive has been announced, as we go to press. There has been a good deal of rioting in the region of Scranton. Miners in the bituminous fields of Illinois have voted to accept the agreement made at Peoria, which, it is said, will give them an increase of about 5½ per cent.

The committee of conductors, brakemen and firemen who are conferring with the general manager of the Pennsylvania Railroad in regard to the conditions of their work, announce that they have demanded that wherever electric service is in operation the rates of pay and the conditions shall be the same as those in steam service; also that the road shall agree that in case trains of another road shall be granted trackage rights over the Pennsylvania that other road shall be bound by the same conditions.

A Queen & Crescent express train was held up on Wednesday of this week by robbers, who escaped with a large sum of money and securities, perhaps as much as \$150,000. The bandits surprised the engineman at Okahola, eight miles south of Hattiesburg, Miss., and crawling on to the tender, ordered the train be pulled around the next curve and then stopped. The engineman and fireman, marched to the express car, were forced to call out the messenger in charge of the car and he in turn summoned the other trainmen. The safe was then blown open.

Special Examiner H. P. Brown, taking testimony in the suit of the government against the United States Steel Corporation, has heard during the past week Daniel G. Reid, a director of the corporation; A. I. Findlay, one of the editors of the *Iron Age*; M. B. Wheeler, secretary of the American Tin Plate Company; John A. Topping, chairman of the Republic Iron & Steel Company, and others. The testimony had to do with alleged agreements between the constituent companies prior to the formation of the corporation in 1901.

The Interborough Rapid Transit Company, New York City, has voluntarily given increases in pay of 5 cents to 20 cents a day to about 8,000 of its employees, the gross annual addition to the pay rolls being about \$230,000. Motormen who have served five years will receive \$3.75 a day instead of \$3.50; conductors in their fifth year will receive \$2.60, and guards \$2.30; porters, train starters, and various other classes will receive an increase of 10 cents a day, and switch tenders 20 cents; gatemen, for the first year, will receive \$1.90 a day instead of \$1.80.

According to the Boston *Transcript*, the Boston & Maine has decided to build an electric railway to the summit of Mount Washington (New Hampshire) and to build on the summit a large fireproof hotel, the total cost of railway and hotel to

be \$1,500,000. The railway will be about 20 miles long, winding twice around the mountain, so as to maintain a uniform grade of not over 6 per cent. The present cog-wheel railway, which is less than three miles long, rises 3,800 ft. in that distance. Water power for the electric road will be furnished by the Ammonoosuc river.

As an incident of the serious war now prevailing in Mexico between rebels and the government, a southbound passenger train was attacked on the night of May 9 near Guadalajara, by bandits or rebels; and, the 70 soldiers aboard the train returning the fire of the attacking party, a fierce encounter ensued, in which 8 soldiers and 12 passengers were killed and as many others injured. The soldiers were overpowered by superior numbers and the passengers were robbed of their money and jewels. The passengers were fleeing from Guadalajara because of the fear of an earthquake.

The committee of the Senate at Washington is still hearing arguments for and against the proposal to forbid the use of the Panama canal by steamships in which railways are interested. The House committee has tentatively agreed on an amendment to the proposed bill which would authorize the Interstate Commerce Commission to determine questions as to whether competition between land and water carriers existed in a given case, but there is radical disagreement in the committee, and this fact, with other perplexities in connection with the proposed bill, lead some observers to think that no action will be taken by Congress at the present session.

The directors of the Boston Chamber of Commerce, having discussed the proposal of the governor of Massachusetts to have the New Haven and the Boston & Maine roads consolidated, and to require them to electrify their lines in and near Boston, have made to the Chamber a report declaring further discussion of the subject necessary. In other words, they are averse to the passage of such a law at the present session of the legislature. The bill now under discussion would not do anything for Boston in the way of removing discriminations on the part of the railways, while the state could compel electrification just as well without the proposed consolidation. No immediate emergency exists, and undue haste is likely to be detrimental to the public welfare.

About 250 pensioned employees of the Southern Pacific attended the annual banquet at the Palace Hotel, San Francisco, on May 10. The banquet this year fell upon the forty-third anniversary of the driving of the last spike of the first transcontinental railway in the United States, at Promontory, Utah. Approximately half of those now on the pension roll were factors in the construction of the system at that time, and it is the annual custom for the road to be built in reminiscence. Part of the entertainment was the exhibition of a complete set of 250 photographs taken during the construction period of the Central Pacific, and several of the higher officers of the road addressed the gathering. Since the inauguration of the pension system on the Southern Pacific January 1, 1903, \$1,015,014 has been paid out in pensions. The system is absolutely voluntary on the part of the company, and 718 former employees have been awarded pensions in these nine years. On May 1 this year there were 477 pensioners on the rolls.

A settlement has been reached between the New York State Public Service Commission and the committee of the New York City Board of Estimate on the differences which have existed between the two bodies as to how the routes of the proposed new subways in the lower part of the city should be apportioned to the Interborough and the Brooklyn Rapid Transit, and it is now said that the long delayed plans for the subways will now have smooth sailing. Instead of having two tunnels paralleling each other near the Battery it was decided to lay out a new line for the Interborough from its proposed west side line through Park place and Spruce or Beekman street to a connection with the William street route, which has already been authorized, and from William street through Old slip, under the East river to Clark street, Brooklyn, and along Clark street to a connection with the present Interborough system at the Brooklyn Borough Hall. To the Brooklyn Rapid Transit Company will be awarded the route that was first mapped out for the Interborough, the Whitehall and Montague streets route. This will enable the Brooklyn company to make an easy con-

nexion at De Kalb avenue with the new Fourth avenue subway in Brooklyn, which is nearing completion. This arrangement provides for three tunnels (two in addition to the existing tube) across the East river at the lower end of Manhattan.

"A Harsh Answer Turneth Away Cash."

H. J. Slifer, general manager of the Chicago Great Western, has issued a circular letter to employees on "courtesy," in which he says in part:

"If there is one thing, with the possible exception of the harassing federal and state railway legislation, that has proved annoying to railway companies more than another, and caused the public to look upon them with disdain and suspicion and consider them legitimate prey for all kinds of abuse, it is the courtesy so frequently found among railway employees, or, what is equally bad, indifference on their part.

"In filling positions requiring contact with the public, there is no easier way to get along with patrons on the road—travelers or shippers—than to give them all the information for which they ask and volunteer something in addition. Such a course cannot fail to make dealings with the public more agreeable and pleasant than by following a contrary plan, and the results to the company more profitable than could be secured by maintaining an arbitrary and indifferent attitude. In business, the adage: 'A soft answer turneth away wrath,' is not only true, but we might add 'A harsh word turneth away cash.'

Addressing particular classes of employees, Mr. Slifer says: Officers, clerks and office people: Be prompt and courteous in your correspondence, in using the telephone and in personal interviews. Maintenance of Way men: Be courteous to our neighbors, those whose property adjoins ours; the farmers . . . Enginemen and Firemen: The public is not supposed to go to you for information, but if you are "oiling 'round" at a station, and a foolish question is asked, do not give a foolish reply. . . . Train and Station Employees: Do not get a reputation for being bluffers; not only give civil replies, but intelligent ones. If a lady asks what is delaying a train, the answer "board's against us" means absolutely nothing to her. . . . If an excited man asks what time the nine o'clock train will leave, don't tell him "8:60"; he is probably laboring under a nervous strain and does not realize what he is saying.

Dinner to "Katy" Officers.

Frank Trumbull, chairman of the board of directors, and Charles E. Schaff, the new president of the Missouri, Kansas & Texas, were honor guests at a dinner given them at the St. Louis Club, at St. Louis, on Saturday evening, May 11, by W. S. McChesney, Jr., president and general manager of the Terminal Railroad Association of St. Louis. The "Katy" officials had just returned from an inspection of the company's lines in Missouri, Kansas, Texas and Oklahoma, and on their arrival in St. Louis were greeted by a reception committee of prominent railway officers, bankers and merchants. The address of welcome at the dinner was made by President McChesney, and responses were made by Messrs. Trumbull and Schaff. The other speakers were D. R. Francis, former governor of Missouri; B. F. Bush, president of the Missouri Pacific and Iron Mountain system; Breckenridge Jones, president of the Mississippi Valley Trust Company; Judge Henry S. Priest, and George J. Tansey, president of the St. Louis Transfer Company.

Annual Passes for Missouri Pacific Employees.

As a reward for faithful service the Missouri Pacific-Iron Mountain system has decided to issue annual passes to employees who have worked for the company 15 years or longer. The rules provide that for 15 years of continuous service an employee may receive an annual pass for himself over the division on which he is employed; for 20 years' continuous service, one for himself and wife over the division, and for 25 years' continuous service one for himself and wife over the entire Missouri Pacific-Iron Mountain system of nearly 7,300 miles. About 1,500 employees will receive these passes, including agents, conductors, engineers, brakemen, train baggagemen, switchmen, firemen, hostlers, telegraphers, bridge and building foremen and section foremen. R. W. Waters, a conductor on a suburban train running out of

St. Louis, now in his 52d year of continuous employment, is the oldest man in point of service on the entire system. John Cook, and his son, C. W. Cook, both employed on the Central Kansas division as passenger enginemen under the 25 years of service ruling are entitled to annual passes for themselves and wives.

Chicago Freight Handlers' Strike.

The effects of the strike of the Chicago freight handlers and clerks, called on May 4, after the railways had refused their demands for higher pay and shorter hours, were of short duration. While there was some congestion of traffic at some of the freight houses during the first days of the strike, there was no violence by the strikers, and the railways soon filled their places with men from outside, while many of the strikers returned to work. The Erie, Santa Fe and Pennsylvania were employing non-union men and were not affected. For a time several of the roads filled the places of the strikers with draftsmen from their engineering departments or clerks from their general office forces or city offices.

On Saturday, May 11, the Chicago Association of Commerce issued a circular to its members urging the importance of the prompt removal of inbound shipments from the various freight houses in order to relieve the railways of any unnecessary handling and delay which might result from holding freight in their warehouses awaiting delivery.

On the same day P. F. Flannery, president of the Brotherhood of Railway Freight Handlers, presented a proposition to the managers, that all the men on strike return to their former positions, and that the entire matter of wages and working conditions be submitted to arbitration. W. A. Garrett, chairman of the General Managers' Association, replied by letter on Monday: "Upon receipt of your letter the writer communicated with the general manager of each line affected, and they advised that the situation in Chicago is now practically normal and the places of the men who left the service voluntarily on short notice have been permanently filled. The inconvenience to the public was only of short duration."

Boiler Explosion on the Southern Pacific.

John F. Ensign, chief inspector of locomotive boilers, for the Interstate Commerce Commission, has made the following report of the investigation of the explosion of the boiler of an Oregon & California locomotive, operated by the Southern Pacific Company, which occurred four miles south of Yoncalla, Ore., on April 4, 1912, and in which the engineman and fireman were killed:

This was a consolidation freight locomotive. At the time of the explosion this locomotive was engaged in helper service on a southbound train of 40 cars, weight of train 1,605 tons, drawn by road locomotive No. 3203, with locomotives No. 2538 and No. 2194 coupled together between the caboose and the rear freight car in the train. The boiler was blown clear of the frames, breaking or pulling out expansion plates around fire box, shearing cylinder saddle bolts, and breaking the front side of saddle; it was blown over three box cars, apparently lighting on the back head on an oil-tank car; it rolled off to the right side and landed on the bank of an 8-ft. cut, a distance of 218 ft. from the point where the explosion occurred.

At the time of the accident, the train was ascending a grade of 84.48 ft. per mile, at a speed of 10 to 12 miles an hour. The accident occurred on a tangent 627 ft. south of a left-hand 8 deg. curve. The elevation of the right-hand rail of this curve was from $3\frac{1}{2}$ to $3\frac{3}{4}$ in. for a distance of 198 ft. in the center of the curve. Our inspection disclosed the fact that almost the entire crown sheet, with the exception of a portion of the left back corner, was overheated. The overheated portions of the sheet extended 4 in. below the highest part of the crown sheet at the right front corner and 1 in. below at the left front corner. At the right back corner it was about on a line with the crown sheet, while there had apparently been water on the left back corner. So far as could be ascertained by our inspection, the injectors, safety valves and steam gage were in good condition. The water glass was so located that the lowest reading was only 1 in. above the highest part of the crown sheet, as indicated by line plate on boiler head. Therefore, on an ascending grade of 84.48 ft. per mile the front of the crown sheet would be uncovered with water still showing in the water glass, and on the high side of the

curve it would be, as indicated in this case, 3 or more inches below the highest portion of the crown sheet, and the glass would still show water. It was also found that other locomotives on the same division have the water glass so located that the lowest reading is from one-half to 1 in. above highest part of crown sheet. On some of these a plate is attached to the water glass frame in such a manner that the lower end of the glass is obscured, thus making the lowest reading 3 in. above highest part of crown sheet. The engineman who ran locomotive No. 2538 on its previous trip into Roseburg on April 3, positively stated that no such plate was attached to water glass on this locomotive.

From statements made by engine watchmen at Drain, who watched the engine while there, it is evident that flues were leaking quite badly, as it was necessary to fill the boiler four times from 7 a. m. to 11 a. m., and that 127 gals. of fuel oil were used, whereas only 30 gals. would have been necessary had not the boiler been leaking. Seven flues were found to be plugged, which is in violation of locomotive boiler inspection rule No. 44.

We find that this accident was caused by an overheated crown sheet, due to the fact that the engine crew were evidently misled in the height of the water on account of an improperly located water glass. We consider the local mechanical officials were at fault for permitting this locomotive to be operated with a water glass not the proper height above crown sheet, as required by rule No. 37, and also for permitting the locomotive to be operated with flues in such a condition that it was necessary to plug a number of them in violation of rule No. 44.

Steel Corporation's Unfilled Tonnage.

The report of the United States Steel Corporation shows that the unfilled tonnage on April 30 was 5,664,885 tons, an increase of 360,044 tons over the previous month. This compares with 3,218,704 tons on April 30, 1911. This statement exceeds even the highest estimates by 74,000 tons. The unfilled tonnage on the books of the Steel Corporation at present is equal to six months' production of the corporation's mills, based on the present rate of output. On March 31, 1912, the unfilled tonnage was 5,304,841 tons; on February 29, 5,454,200 tons, and on January 31, 5,379,721 tons. The present unfilled tonnage is the largest since December 31, 1909, when it was 5,927,031 tons.

Gas-Electric Cars for the Frisco.

The St. Louis, Brownsville & Mexico, one of the lines of the Frisco system, has ordered two gas-electric motor cars of the GE-70-B-11 type from the General Electric Company, Schenectady, N. Y. These cars will be built with side entrances for the passengers and a rear door for the use of the conductor when the cars are coupled to trailers. The Frisco system will now have 17 of these cars running on regular schedules over its lines operating between the following points: Brownsville, Tex., and Mission; Orange and Newton; Madill, Okla., and Ardmore; Westville and Muskogee; Lawton, Okla., and Quanah, Tex.; Eunice, La., and Crowley; Dallas, Tex., and Sherman; Enid, Okla., and Bailey; Salem, Mo., and Cuba; Bolivar and Chadwick. The cars are capable of running about 60 m. p. h. on a level stretch and will average 25 to 35 m. p. h. schedule speed with stops two to three miles apart.

The new cars are 70 ft. 5 in. long and are divided into four compartments, one for passengers, which is 33 ft. long; a smoking compartment, 10 ft. long; a baggage compartment, 11 ft. long and the engine room, 12 ft. long. Each car has a seating capacity for 92 passengers, each seat accommodating 3 persons, and the net weight of the car is approximately 50 tons. It is of all-steel construction, except the interior finish, which is of mahogany and composite board. The frame is made up of steel I-beams and channels, with steel plates for the outside sheathing. The under floor is made of wood, having sheet iron on the lower side. A heavy felt lining is inserted between the wood and the iron. The sides of the car are also insulated with felt. The steel roof and the rear of the car are of the turtle back design. The seats are covered with friezette plush in the passenger compartment and genuine Spanish leather in the smoking room. The entire car is lighted with electricity.

The engine is an 8-cylinder, 4-cycle gas engine of the V type and is direct connected to a 600-volt generator, which is designed

to meet the special conditions of this service. The engine is started by compressed air taken from the main reservoirs of the air brake system. The main air compressor is driven from the crank shaft of the main engine and is fitted with an automatic governor which maintains a constant pressure. An auxiliary two-cylinder, 4-cycle engine operates a single cylinder air compressor and the lighting generator. This set is used for supplying the initial charge for starting the main engine. Two railway motors of the GE-205-600 volt, box frame, oil lubricated, commutating pole type having 100 h. p. capacity, are mounted on the axles of the forward truck. The voltage of these motors is governed by varying the strength of the generator field and they are placed in series or parallel by means of a special controller. Separate handles are also provided for throttling the engine and for reversing the car, the latter being accomplished by changing the motor connections in the usual manner, without stopping the engine. All the handles are in easy reach of the operator.

The trucks are of the swing bolster type, having elliptic and coil springs. The bearings, wedges and the contour of the wheels conform to the M. C. B. standards. The brake equipment includes the hand and the combined straight and automatic air brakes. A hot water heater, coal fired, is used for heating the car and to prevent the freezing of the engine circulating water this system is connected to the engine cooling system when necessary.

American Iron & Steel Institute.

At the second general meeting of the American Iron & Steel Institute, to be held at the Waldorf-Astoria hotel, New York, May 17, the following addresses will be made: Address of the president, by E. H. Gary, chairman of the United States Steel Corporation; Contract Obligations, by E. A. S. Clarke, president of the Lackawanna Steel Company; discussion by Willis L. King, vice-president of the Jones & Laughlin Steel Company, James A. Farrell, president of the United States Steel Corporation, and others; Competition, Its Uses and Abuses, by Joseph G. Butler, Jr., vice-president of the Brier Hill Steel Company; discussion by John A. Topping, chairman of the Republic Iron & Steel Company, and Charles M. Schwab, president of the Bethlehem Steel Corporation; Some Experiences in India, by Julian Kennedy, consulting engineer; Electric Furnaces, by William R. Walker of the United States Steel Corporation; discussion by Theodore W. Robinson, vice-president of the Illinois Steel Company, Eugene B. Clark, American Sintering Company, and S. F. Wellman of the Wellman-Seaver-Morgan Company; Corrosion of Steel and Its Prevention, by Dr. A. S. Cushman of the Institute of Industrial Research; discussion by Louis J. Campbell, Youngstown Sheet & Tube Company; Metals and Alloys, by John S. Unger, Carnegie Steel Company; discussion by J. D. Waterhouse, Lackawanna Steel Company. A banquet will be held at the Waldorf in the evening at which the following subjects will be discussed: Enforcement of Health Laws, by Dr. Thomas Darlington; Something Doing in Colorado, by Dr. Richard W. Corwin; Rendering Labor Safe, by Raynal C. Bolling; Mining Operations on the Mesaba Range, by William J. Olcott, president of the Oliver Iron Mining Company. Lantern slide views will be shown, illustrating mining operations on the Mesaba range.

Master Boiler Makers' Association.

The sixth annual convention of the Master Boiler Makers' Association was held in Pittsburgh, Pa., May 14 to 17. The first session was called to order by President George W. Bennett. The address of welcome was made by Charles A. O'Brien, the attorney for the city of Pittsburgh, who represented the mayor. L. H. Turner, superintendent of motive power of the Pittsburgh & Lake Erie, spoke of the responsibilities and duties of the boiler shop foreman. T. W. Low, vice-president of the association, responded. William McConway, of the firm of McConway & Torley, gave some reminiscences of the early days of the city and its transportation facilities. George Wagstaff responded to Mr. McConway. J. F. Deems spoke of the work of the foreman and urged that far more could be obtained from men by kindly treatment than in any other way. There are very few men who will not respond to kindness, and when such a man does get into a shop it is well to get rid of him in the shortest possible time. The response to Mr. Deems was made by W. H. Laughridge, the chairman of the executive board of

the association. The closing address of the opening session was that of the president, who dealt with the progress of the association and its affairs.

The treasurer's report showed the association to be in good financial condition, with a cash balance of \$391.77; the total membership in good standing is 218. The registration of the first day showed an attendance of 266 men and 131 ladies. A letter was read from the International Society for Testing Materials inviting the association to send a representative to the sixth congress, which is to be held in New York in September. Charles P. Patrick was elected to represent the association. An invitation was also received from the Third National Conservation Congress, asking that the association send five delegates and five alternates to the convention in Kansas City, Mo., in September. The invitation was accepted.

Cleveland Engineering Society.

At the regular meeting of the Cleveland Engineering Society, held May 14, illustrated papers on River and Harbor Improvement were presented by Col. John Millis, U. S. A., from an engineering standpoint, and by Charles W. Hopkinson, architect, from an esthetic standpoint. At the special meeting to be held May 27 a paper will be presented on The Engineering of Men by Willard Beahan (L. S. & M. S.).

American Society of Civil Engineers.

At the meeting of the American Society of Civil Engineers, held May 15, a paper by J. V. Davies, M. Am. Soc. C. E., entitled Air Resistance of Trains in Tube Tunnels, was presented for discussion and illustrated with lantern slides. This paper was printed in the *Proceedings* for April, 1912.

American Railway Engineering Association.

The American Railway Engineering Association has moved its offices from the Monadnock block to the Karpen building, Chicago.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

- AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.
- AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomastor, Boston, Mass.
- AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, New York; next convention, September 12, Seattle, Wash.
- AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, East St. Louis, Ill.; annual, June 18-21, Detroit, Mich.
- AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—O. G. Fetter, Carew building, Cincinnati, Ohio; 3d Friday of March and September.
- AMERICAN ELECTRIC RAILWAY ASSOCIATION.—H. C. Donecker, 29 W. 39th St., New York. Convention, October 7-11, Chicago.
- AMERICAN ELECTRICAL RAILWAY MANUFACTURERS' ASSOC.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.
- AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York.
- AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Convention, 3d week in Oct., Baltimore, Md.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, Monadnock Block, Chicago.
- AMERICAN RAILWAY MASTER MECHANICS' ASSOC.—J. W. Taylor, Old Colony building, Chicago. Convention, June 17-19, Atlantic City, N. J.
- AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—M. H. Bray, N. Y. N. H. & H., New Haven, Conn. Convention, July 9, Chicago.
- AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.
- AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York; spring meeting, May 28-31, Cleveland, Ohio.
- AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Convention, 3d week in January, 1913, Chicago.
- ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago; annual, June 26, 1912, Quebec, Que.
- ASSOCIATION OF RAILWAY CLAIM AGENTS.—J. R. McSherry, C. & E. I., Chicago; annual convention, May 21-23, 1912, Los Angeles, Cal.
- ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual, June 11, Atlantic City, N. J.; annual, October 21-25, Chicago.
- ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 135 Adams St., Chicago; annual, June 24, 1912, New York.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conrad, 75 Church St., New York. Convention, Oct. 7-11, Chicago.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July and August and September, St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago. Convention, May 22-25, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—L. H. Bryan, Brown Marx building, Birmingham, Ala. Convention, July 23-26, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Convention, August 15, Chicago.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony building, Chicago. Annual convention, June 12-14, Atlantic City, N. J.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Convention, September 10-13, Denver, Col.

NATIONAL RAILWAY APPLIANCES ASSOC.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NORTHERN RAILROAD CLUB.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 2 Rector St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.; next meeting, August 13-16, Roanoke, Va.

RAILWAY INDUSTRIAL ASSOCIATION.—G. L. Stewart, St. L., S. W. Ry., St. Louis, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio. Convention, May 20-22, Buffalo, N. Y.

RAILWAY SUPPLY MANUFACTURERS' ASSOC.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. assocs.

RAILWAY TEL. & TEL. APPLIANCE ASSOC.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

RICHMOND RAILROAD CLUB.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. September 10-13, Buffalo, N. Y.

ST. LOUIS RAILWAY CLUB.—B. W. Fraumenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Niquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

TRAFFIC CLUB OF CHICAGO.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7042 Stewart Ave., Chicago; annual, June 18, 1912, Louisville, Ky.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y.; annual, Aug. 27-30, Chicago.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

C. S. Bather has been appointed traffic manager of the Rockford Manufacturers' and Shippers' Association of Rockford, Ill., succeeding L. D. Rosenheimer.

The Topeka Traffic Association is organizing a traffic bureau, and H. D. Driscoll, heretofore assistant to the rate expert of the Kansas Public Utilities Commission, has been appointed traffic commissioner.

Following the announcement of several of the western lines that they would meet the competition of the Gould lines in extending homeseekers' fares to California, the Western Passenger Association, at a recent meeting, decided to extend these fares also to North Pacific coast points.

On May 1 the Denver & Rio Grande and Western Pacific established a daily line of electric-lighted observation-end sleeping cars between Denver, Salt Lake City and San Francisco, without change of cars, leaving Denver at 8:00 a. m., and arriving at San Francisco at 9:10 a. m. the second morning.

The Southwestern Passenger Association will place on sale on July 1 a new interchangeable mileage scrip book to supersede the present credential system. The new book will be good for 2,000 miles of transportation, and will be sold for \$60. After the 2,000 miles has been used a refund of \$10 will be made.

At the annual election of the Toledo Transportation Club, L. G. Macomber, president of the Macomber Traffic Bureau, was elected president; W. C. Thoms, commercial agent of the Michigan Central, first vice-president; Simpson G. Harvey, of the Toledo & Ohio Central, second vice-president; J. S. Marks, agent of the Interstate Despatch, secretary, and F. von Nostitz, freight agent of the Michigan Central, treasurer.

J. S. Farlee, of New York, president of the Tuscarora Valley Railroad Company, offers to the largest producer and shipper of milk in the Tuscarora valley, during the year 1912, a handsome sterling silver cup. The cup, a picture of which has been published in local newspapers, is 8 in. high, or 13 in., including its pedestal. The Tuscarora Valley road connects with the Pennsylvania at Port Royal, Juniata county, Pa., 3 miles east of Mifflin.

Traffic Club of New York.

The Traffic Club of New York will play a game of baseball with the Traffic Club of Philadelphia at the annual outing of the latter club in Philadelphia, Pa., May 25.

Revenues and Expenses in February.

The bureau of railway economics bulletin number 32 shows that the railways whose returns are included in this bulletin operate 218,794 miles of line, or about 90 per cent. of all the steam railway mileage in the United States. The total operating revenues for the month of February, 1912 amounted to \$211,344,859. Compared with February, 1911, the total operating revenues of these railways show an increase of \$20,201,839. These total operating revenues per mile of line amounted to \$966 in February, 1912, and \$891 in February, 1911, an increase for 1912 of \$75, or 8.4 per cent. This increase resulted almost wholly from an increase in freight revenue. Passenger revenue showed a slight decrease.

Attention is directed to the fact that the monthly report of railway revenues and expenses issued by the Interstate Commerce Commission has been modified to cover only those railways having annual operating revenues of \$1,000,000 or over. The summary herewith presented by the bureau of railway economics, conforming to this change of base, includes the returns of roads having annual operating revenues of \$1,000,000 or over, instead of roads over 50 miles long as heretofore.

Operating expenses amounted to \$155,771,838. This was \$12,415,255 more than for February, 1911. These operating expenses per mile of line amounted to \$712 in February, 1912, and \$668 in February, 1911, an increase for 1912 of \$44 per mile, or 6.6 per cent. In the cost per mile of conducting transportation there was an increase compared with February, 1911 of 8.2 per cent.; in the cost per mile of maintaining equipment an increase of 7.3

per cent.; in traffic expenses per mile an increase of 5.2 per cent.; and in the cost per mile of maintaining way and structures, i. e., track and buildings, an increase of 1.7 per cent.; in general expenses per mile there was a decrease of 0.2 per cent.

Net operating revenue amounted to \$55,573,021. This was \$7,786,584 more than for February, 1911. Net operating revenue per mile of line amounted to \$254 in February, 1912, and \$223 in February, 1911, an increase for 1912 of \$31 per mile, or 14.1 per cent. The net operating revenue for each mile of line for each day in February averaged \$8.76, and \$7.95 in February, 1911.

Taxes for the month of February amounted to \$9,569,632, or \$44 per mile, an increase of 10.9 per cent. over February, 1911.

The operating ratio for February was 73.7 per cent., which is comparable with 78.2 per cent. in January, 1912, and 75.0 per cent. in February, 1911.

The eastern group of railways show an increase in total operating revenues per mile as compared with February, 1911, of 12.0 per cent., the southern group an increase of 5.4 per cent., and the western group an increase of 6.3 per cent. Operating expenses per mile increased 9.1 per cent. on the eastern railways as compared with February, 1911, 9.2 per cent. on the southern railways, and 3.1 per cent. on the western railways. In the eastern group net operating revenue per mile increased 22.8 per cent. as compared with February, 1911; in the southern group it decreased 3.1 per cent.; in the western group it increased 15.3 per cent. The increase in taxes per mile compared with February, 1911, was 11.6 per cent. in the eastern group, was negligible in the southern group, and was 14.4 per cent. in the western group.

Comparison of the returns for the eight months of the fiscal year 1912 with those of the corresponding months of the fiscal year 1911 shows a decrease in total operating revenues per mile of 0.9 per cent., a decrease in operating expenses per mile of 0.9 per cent., and a decrease in net operating revenue per mile of 0.8

per cent. This net operating revenue per mile of the eastern group of railways increased 7.2 per cent. as compared with the corresponding period of 1911, the net revenue per mile of the southern group decreased 7.0 per cent., and the net revenue per mile of the western group decreased 5.4 per cent.

The accompanying tables show the per cent. of the various classes of operating expenses to total operating revenue. Both the January and February figures are shown so as to make the year 1912 and its comparisons complete on the new basis of roads whose gross earnings are more than \$1,000,000 annually.

The accompanying diagram shows monthly revenues and expenses and net per mile of line for roads divided into three groups. It should be noted that the figures are not cumulative so that the points on the vertical lines are alone of significance.

INTERSTATE COMMERCE COMMISSION.

The commission has decided that free transportation may not be given to traveling secretaries of Young Women's Christian Associations.

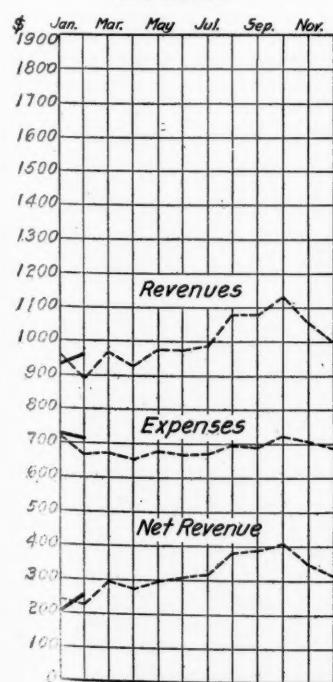
The commission has decided that a railway may not lawfully tell a shipper the name of the ultimate consignee of a shipment re-consigned in transit by the original consignee.

The Dixie Dairymen's Association has complained to the commission of the rates on milk in cans over the Yazoo & Mississippi Valley from points in Mississippi to New Orleans.

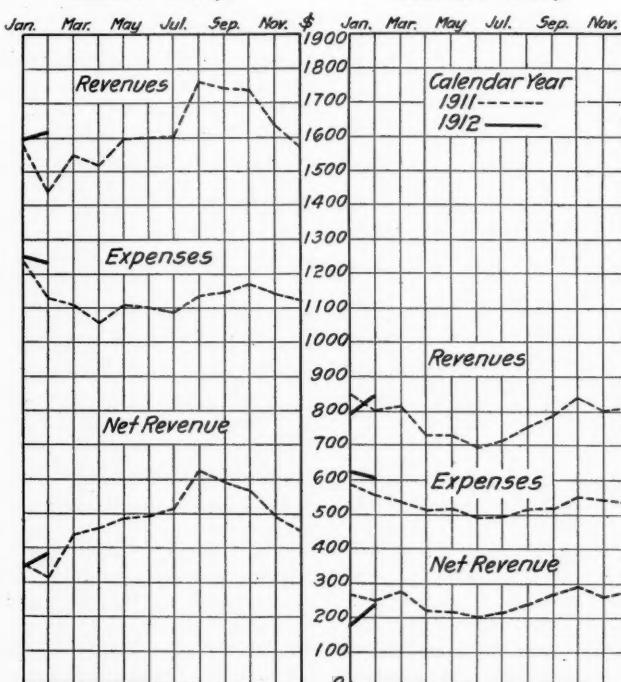
The commission has canceled its order suspending the rates on live stock from points in New Mexico and Fort Worth, Tex., Oklahoma City, Okla., and Wichita, Kan. The rates which the commission had suspended correspond with those

	January, 1912.	January, 1911.	Fiscal Year Ended June 30, 1911.	Fiscal Year Ended June 30, 1910.	Calendar Year Ended Dec. 31, 1911.	Calendar Year Ended Dec. 31, 1910.
Per Cent. of Total Operating Revenues:						
Maintenance of way and structures.....	11.6	11.4	12.5	12.7	12.7	13.3
Maintenance of equipment.....	18.4	17.5	14.9	14.5	15.5	15.3
Traffic expenses	2.3	2.3	2.1	2.0	2.1	2.1
Transportation expenses.....	43.0	41.1	34.2	32.2	35.4	34.7
General expenses	2.9	2.8	2.4	2.3	2.9	2.8
Per Cent. of Total Operating Revenues:						
Maintenance of way and structures.....	10.9	11.6	12.5	12.7	11.2	11.5
Maintenance of equipment.....	17.3	17.5	14.9	14.5	17.9	17.5
Traffic expenses	2.3	2.4	2.1	2.0	2.3	2.3
Transportation expenses.....	40.5	40.6	34.2	32.2	41.7	40.8
General expenses	2.7	2.9	2.4	2.3	2.8	2.9

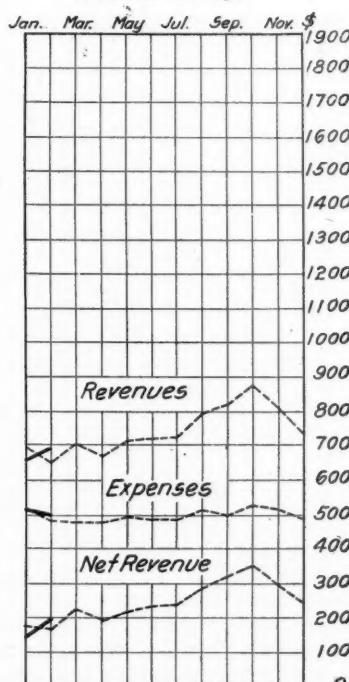
All Roads.



Eastern Group.



Southern Group.



Monthly Revenues and Expenses per Mile in 1912 as Compared with 1911.

proposed by the commission itself in its recent investigation of live stock rates in the southwest.

The commission has suspended until September 7, the tariff's canceling commodity rates on tin plate, sheet metal, etc., from eastern shipping points to Oregon, Wash., and north Pacific coast points. The commodity rates are 75 cents per 100 lbs., and cancellation of this rate would put these commodities in third class, on which the rate is \$1.65 per 100 lbs.

The commission has decided that when a shipment leaves a point of origin in a single car and is later broken up and put in two cars by the railway company for its own convenience, demurrage should be assessed for one car only, so long as either car is detained, and switching, reconsignment and diversion charges should be assessed for one car only.

The commission has begun a hearing on the question of whether or not pipe lines are common carriers within the meaning of the Interstate Commerce law. The independent oil companies claim that all pipe lines are common carriers, but the Standard Oil Company claims that their lines were built for the sole purpose of supplying their customers and are not therefore common carriers.

The Bozeman, Mont., chamber of commerce has sent a protest to the Interstate Commerce Commission, objecting to the proposed compromise between Spokane and the transcontinental railways which was described in our last week's issue. The compromise plan was submitted to the commission at Washington on May 8, and the commission announced that statements or criticisms of the proposed arrangement may be filed up to June 1.

Special Examiner Pugh of the Interstate Commerce Commission, held a hearing at Chicago on May 7 and 8, for the purpose of obtaining the views of grain shippers as to the proper amount of elevation allowances. The witnesses were practically unanimous in saying that one-fourth of a cent was sufficient for the transfer of grain at elevators, and that this figure approximated the cost of the transaction. The hearing was continued on May 9 at Omaha, and on May 10 and 11 at Kansas City.

Complaint Dismissed.

Association of Bituminous Coal Operators of Central, Pennsylvania v. Pennsylvania Railroad. Opinion by Commissioner Lane:

In this case the complainant alleges that the rate of \$1.55 per gross ton of bituminous coal from the Clearfield district of Pennsylvania to South Amboy, N. J., a distance of 345 miles, is unreasonable. The complaint also alleges that the rate adjustment, under which the Latrobe district, which adjoins the Clearfield district on the West, is given the same rate as the Clearfield district, and by which the Greensburg district, which lies immediately West of the Latrobe district, takes a rate of only \$0.10 higher than the Clearfield district, is unduly preferential to the Latrobe and Greensburg districts and unduly discriminatory to the Clearfield district. The evidence was not conclusive, so the complaint was dismissed. (23 I. C. C., 385.)

Fourth Section Application Denied.

Grand Junction Chamber of Commerce v. Denver & Rio Grande Railroad Company et al. Opinion by Chairman Prouty:

The application of the Denver & Rio Grande and the Colorado Midland for permission to charge higher rates at intermediate points than are contemporaneously in effect to more distant points on their lines, denied as to all westbound traffic originating at the Missouri river, the Mississippi river, Chicago, and similar rate territory. (23 I. C. C., 115.)

Newport News Discriminated Against.

Chamber of Commerce of Newport News, Va., v. Southern Railway et al. Opinion by the commission:

Until July 31, 1899, Newport News had the same rates as Norfolk to and from common points in the associated railways' territory and in the southeastern freight association territory. On July 31, 1899, these rates were abolished and Newport News, instead of a through rate, was given a combination of local rates which was greater than the Norfolk rates. This was done because the Chesapeake & Ohio, the only road whose

lines reached Newport News, declared that it was not receiving a fair division of the through rates. The complainant now alleges that the present rates are unduly discriminatory to Newport News in favor of Norfolk, and that Newport News should be given the same rates as Norfolk. Since the abolition of the equal rates, the Chesapeake & Ohio has maintained that Newport News should be given the same rates as Norfolk, and has offered to agree to any fair arrangement that should be suggested by the other lines to make these rates equal. The other lines, however, refused to make any such arrangement. These lines claim that the lower rates to and from Norfolk are the result of competition, and that as their lines do not reach Newport News, they are not responsible for any discrimination against that point which may exist. The commission found that although competition might result in granting lower rates to one point than to other points reached by the same carriers, it was only when this competition was beyond the control of the carriers that the resulting difference in rates was not unduly discriminatory. The commission decided that in this case the competition was not beyond the control of the carriers, for no complaint of competition had been made while the Newport rates and the Norfolk rates were equal. The commission also decided that since the defendants whose lines did not reach Newport News received traffic to and from Newport News, they were not relieved from the responsibility for the effect of rates which they controlled and in which they participated. None of the defendants contended that a shrinkage in its revenues, necessary to give Newport News the Norfolk rates, would make the reduced rates unprofitable. The commission decided that the present rates were unduly discriminatory to Newport News in favor of Norfolk, and that Newport News should be given the Norfolk rates. No order was made, but if the new tariffs are not filed by June 1, 1912, the commission will take steps to enforce its findings. The commission leaves the points of discussion between the carriers to be settled among themselves. If they cannot agree the commission will determine the matter. (23 I. C. C., 346.)

STATE COMMISSIONS.

Former Governor Samuel W. Pennypacker of Pennsylvania has been appointed a member of the railway commission of that state, succeeding Charles N. Mann, deceased.

The Illinois railway commission has issued an order that the rear doors of all private or special cars shall be kept unlocked, so that the rear platforms may be more readily accessible to flagmen.

The Washington public service commission has announced that a hearing will be held at Seattle on June 25, for the purpose of making an investigation of the express rates charged in state traffic in response to a complaint filed by the Transportation Bureau of the Seattle Chamber of Commerce.

The Indiana commission has declined to order another passenger train run on the Effner branch of the Pennsylvania lines, between Logansport and Effner. The request for additional trains was presented by traveling salesmen of Logansport, who found the present schedule not suited to their itineraries. The commission found that the earnings of the road were not sufficient to warrant the desired order.

The Vermont railway commission has held that the Vermont statute, permitting four days free time for loaded cars, as against the federal rule permitting only two days free time before demurrage is assessed, applies only to intrastate shipments and does not apply to interstate shipments, and therefore is not invalid. The railway companies have appealed to the Supreme Court contending that the statute is unconstitutional.

The Massachusetts Commission, responding to a request from a legislative committee, has written a letter disapproving a bill which would permit the New York, New Haven & Hartford to take over all the trolley lines in western Massachusetts, commonly known as the "Western Merger Bill." The letter declares that the bill is contrary to the recognized policy of the commonwealth; that the board is entirely opposed to it, and that it should be referred to the next legislature. The street railways whose securities and assets it is proposed to take over in whole or in part by the new company are the Springfield, the Worcester

Consolidated, the Milford, Attleboro & Woonsocket, the Worcester & Shrewsbury, the Berkshire and the Worcester & Webster. The commissioners call especial attention to the provision of the bill for capitalizing the amount of premiums paid upon the capital stock of the underlying corporations, and of the notes and indebtedness of these corporations at their face value without any investigation as to whether they were properly issued or incurred. In both of these provisions the bill proposes to reverse the policies under which the commonwealth has kept down the capitalization of public service companies. The enactment of this bill would open the door for an increased capitalization of \$22,398,863.

Block Signals in Indiana.

The Indiana commission reports that since action was begun by the commission to require the installation of the block system on railways, in accordance with the compulsory law of that state, agreements have been reached with the railways for the equipment of 792 miles at an estimated cost of \$1,168,000. The names of the roads, with the mileage on each, are given in the table shown below. The amounts of the estimates seem to indicate that automatic signals are calculated at \$2,000 a mile; while some of the estimates appear to be too small for a automatic signals and too large for a simple manual system.

	Mileage.	Estimated Cost.
Pennsylvania Lines	4	\$7,000
Cincinnati, Hamilton & Dayton.....	48	55,000
Baltimore & Ohio Southwestern.....	15	20,000
Chicago & Eastern Illinois and Evansville & Terre Haute	64	80,000
Erie	157	350,000
Wabash	40	50,000
Lake Erie & Western	18	25,000
Chicago, Indianapolis & Louisville.....	300	325,000
Indiana Union Traction	18	18,000
Terre Haute, Indianapolis & Eastern	15	12,000
Cleveland, Cincinnati, Chicago & St. Louis	27	54,000
Grand Trunk	86	172,000
	792	\$1,168,000

New York—New Haven Authorized to Purchase Rutland.

The New York Public Service Commission, Second district, on May 10 granted permission to the New York, New Haven & Hartford to purchase \$4,704,100 of the stock of the Rutland, owned by the New York Central & Hudson River. This authorization will give the New Haven a control of the Rutland property. The action upon the application was by unanimous vote.

The commission holds that the acquisition of the stock of the Rutland by the New Haven is not believed to be in violation of the Sherman law, and is not in violation of the principles laid down in any decision of the courts to which its attention has been called.

The Rutland, in connection with its subsidiary water line, the Rutland Transit Company, is a natural route between New England territory, reached only by the New Haven, and the West and Northwest. The operation of the Rutland by the New Haven will in effect constitute a new through line from New England to all points reached by the Rutland Transit Company. The New York Central, which at present controls the Rutland, is to a material extent a competitor with the Rutland, while on the other hand the Rutland is by its connection with the Boston & Maine, a natural extension of the New Haven system as at present operated, and the natural effect of the control of the Rutland by the New Haven will be to increase competition and induce a very considerable increase of business over the Rutland from and to New England points.

If such anticipated increase of business over the Rutland is realized it will afford additional facilities to the public, and be of very considerable benefit to the cities and villages reached by the Rutland in New York and Vermont.

The commission adheres to the principle laid down by it in the New York, Ontario & Western case, that in transfers of control of a subsidiary railway it should recognize and protect the rights of minority stockholders. It does not follow, however, from this principle that in every case the purchasing road should offer to the minority stockholders the same price for their stock which it is willing to pay for control. While such a condition might well be imposed in a case where the transfer would create a control by a traffic line which did not theretofore exist, in the present case the control is now in the hands of the New York

Central, and the relief sought is merely the transfer of that control to the New Haven. If the result of the transfer to the New Haven is to increase the business of the Rutland, and thereby increase its revenues, it will be to the manifest advantage of the minority stockholders. The position taken by the objecting minority stockholders has been that they are now injured by the treatment received from the New York Central. They do not suggest that the New Haven will accord them worse treatment, while on the other hand the commission is satisfied that it will be to the advantage of the New Haven to develop the Rutland materially beyond its present stage.

It is to the public interest of that portion of the state of New York through which the Rutland passes that the control of the road be put in the hands of the New Haven, and since this can be done without apparent injury to the minority stockholders and in the opinion of the commission with benefit and advantage to them, the authorization for the transfer should be made.

COURT NEWS.

The Texas & Pacific, the Houston, East & West Texas, and the Houston & Shreveport have appealed to the commerce court from the decision of the Interstate Commerce Commission in the so-called Texas case in which the commission claimed jurisdiction over state rates when they affect interstate rates.

W. C. Brown, of the New York Central & Hudson River, and C. S. Mellen of the New York, New Haven & Hartford, have both filed their answers in the suit brought to enjoin permanently the sale of the Rutland majority stock by the N. Y. C. & H. R., to the New Haven. Both answers claim that the minority interests are in no way hurt by the sale.

United States Judge Carpenter has temporarily enjoined 25 railways from interfering in their tariff schedule with the Michigan, Indiana & Illinois line, steamship operators on Lake Michigan, and the Ludington Transportation Company. The Interstate Commerce Commission recently advised the railways to cancel their joint rates with these lines because they were held to be plant facilities.

Federal Employers' Liability Law.

The Supreme Court of the United States, in a decision by Justice Hughes, in the case of Schubert against the Baltimore & Potomac, holds that acceptance of benefits from a relief association is not a bar to a suit against the railway for personal injuries under the federal employers' liability law. The agreement of the employee with the relief association was made before the federal law was passed, and was claimed by the railway to be a binding contract, but this argument the court rejects.

Schubert was a brakeman and sued for damages on account of personal injuries sustained in the line of his employment. He was awarded judgment for \$7,500. The railway company defended on the ground that Schubert had signed certain regulations, among them one agreeing to exempt the company from liabilities.

The court citing a recent decision (at this term) in the case of the Chicago, Burlington & Quincy against Maguire, which sustained the constitutionality of an amendment to the employers' liability law of the state of Iowa, which enacted that an employee could not enter into a contract through a relief society that would exempt the employer from liability, takes the view that the same rule applies to the federal employers' liability act. The contention of the road, that, because Schubert had signed the regulations of the relief fund before the employers' liability act was passed, such agreement of membership amounted to a contract in existence at the time the law was enacted, which could not be impaired by the statute was rejected. Justice Hughes declared that the power of Congress to regulate interstate commerce could not be interfered with by existing private contracts. Railways in organizing and financing relief funds among their employees with a view of securing immunity from damages for personal injuries, must have entered into these contracts with full knowledge that Congress had the power to pass an employer's liability act at any time which would practically annul such contracts.

Railway Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Lovick P. Miles, general attorney of the Missouri Pacific-Iron Mountain system, with office at Fort Smith, Ark., has resigned to engage in private practice.

H. A. Scandrett, assistant interstate commerce attorney of the Harriman Lines at Chicago, has been appointed interstate commerce attorney, with office at Chicago, succeeding F. C. Dillard, resigned to become vice-president and general counsel of the Rock Island Lines.

Robert W. Baxter, who has been elected vice-president of the Alaska Steamship Company and the Copper River & Northwestern Railway, with office at Seattle, Wash., as has been announced in these columns, was born February 22, 1859, in Scotland. He began railway work with the Union Pacific as a messenger boy, and was with that road continuously from 1878 to 1890, and again from September, 1891, to October, 1903, having been consecutively telegraph operator, train despatcher, chief train despatcher, trainmaster, superintendent and general superintendent. He was superintendent of the Oregon and Washington divisions at Portland, Ore., from September, 1891, to June, 1892; was then until July, 1894, general superintendent of the Pacific

division at Portland, in charge of rail and water lines; for the next four years was general agent for the receivers of the road, in the freight and passenger departments, at Portland, and from July, 1898, until he left the road in October, 1903, he was superintendent of the Nebraska division at Omaha. From April to September in 1891 Mr. Baxter was superintendent of the Ohio and Midland divisions of the Baltimore & Ohio at Newark, Ohio. In July, 1904, he went with the Lehigh Valley, with which road he was successively until January, 1910, superintendent of the Pennsylvania division at Sayre, Pa.; superintendent of the Wyoming division at Wilkesbarre, Pa.; superintendent of rail and water lines at Buffalo, N. Y., and superintendent of transportation, with office at South Bethlehem, Pa. He was appointed general superintendent of the Illinois Central lines north of the Ohio river, with office at Chicago, on July 1, 1910, which position he recently resigned to accept the vice-presidency of the two companies mentioned above.

Operating Officers.

J. P. Church has been appointed superintendent of telegraph of the Wabash, with office at Decatur, Ill., succeeding G. C. Kinsman, retired.

R. O. Roy, division freight agent of the Rock Island Lines at Alexandria, La., has been appointed general manager of the Crossett, Monticello & Northern, with office at Crossett, Ark.

William F. Haley has been appointed superintendent of the American Refrigerator Transit Company, with office at St. Louis, Mo., succeeding J. D. Ahern, resigned to engage in other business.

R. M. Cox, assistant general manager in charge of claims of the Texas Central, with office at Waco, Tex., having resigned, that office has been abolished, and claims will be handled by other officers of the road.



R. W. Baxter.

D. L. Sommerville, assistant superintendent of the New York Central & Hudson River, at Jersey Shore, Pa., has been appointed superintendent of the Adirondack division, with office at Utica, N. Y., succeeding J. W. Eber.

F. G. Minnick has been appointed car accountant of the Pittsburgh & Lake Erie, with office at Pittsburgh, Pa. He will have charge of all matters pertaining to car records, per diem and mileage, reporting to the superintendent car service of that company.

Harry C. Owen, trainmaster of the Northern Railway (Costa Rica) has been appointed superintendent, with office at Limon, Costa Rica, succeeding J. H. Burke, whose appointment as general superintendent of the same company, was recently announced in these columns.

J. W. Smith has been appointed assistant superintendent of the Indiana Harbor Belt, with headquarters at Gibson, Ind., succeeding J. W. Callahan, resigned to accept service with another company. N. D. Connelly has been appointed general yardmaster at Gibson.

J. H. Fraser, general superintendent of the Detroit, Toledo & Ironton, at Springfield, Ohio, has been appointed superintendent of transportation of the Maine Central, the Sandy River & Rangeley Lakes, and the Portland Terminal Company, with office at Portland, Maine.

M. J. Foley, trainmaster of the Chicago, Burlington & Quincy at Greybull, Wyo., has been appointed assistant superintendent, with office at Kirby, Wyo., with jurisdiction over the Chicago, Burlington & Quincy line from Billings, Mont., to Thermopolis, Wyo., from Frannie, Wyo., to Cody, and extending south of Thermopolis.

F. W. Peters, assistant to the vice-president of the Canadian Pacific, at Winnipeg, Man., has been appointed general superintendent of the British Columbia division, with office at Vancouver, B. C., succeeding James Oborne, deceased, and A. E. Stevens, until recently superintendent of the Manitoba division at Winnipeg, has been appointed assistant general superintendent of the British Columbia division.

F. J. Easley, general superintendent of the First district of the Rock Island Lines, at Des Moines, Iowa, has been appointed assistant general manager of the First district, with office at Des Moines. J. B. Smalley, general superintendent of the Second district, at Topeka, Kan., has been appointed assistant general manager of that district, with office at Topeka, and T. H. Beacom, general superintendent of the Third district, at El Reno, Okla., has been appointed assistant general manager of the Third district, and the office of general superintendent has been abolished, effective May 15.

R. H. L'Hommedieu, general manager of the Michigan Central, with office at Detroit, Mich., has resigned on account of ill health, and has been appointed assistant to A. H. Smith, vice-president of the New York Central Lines. Mr. L'Hommedieu will have his headquarters at Detroit. His jurisdiction will be confined to the Michigan Central, and he will perform such duties on that line as may be assigned to him from time to time. E. D. Bronner, who has been connected with the Michigan Central for the past 20 years, and who has been superintendent of motive power for a number of years, with office at Detroit, has been appointed general manager, succeeding M. L'Hommedieu.

J. W. Kelly, Jr., whose appointment as superintendent of the Cumberland division of the Baltimore & Ohio, has been announced in these columns, began railway work as a clerk in the office of the superintendent of the Baltimore & Ohio, at Baltimore, Md., and was afterwards transferred to the office of the general superintendent, and then to the office of the general manager. On November 1, 1901, he was promoted to assistant trainmaster, with headquarters at Cumberland, and in January, 1903, he became assistant chief clerk in the general superintendent's office at Baltimore and was later made chief clerk of the same office. Mr. Kelly was promoted to trainmaster of the Baltimore division in April, 1905, and was made assistant superintendent of the Cumberland division, with office at Keyser,

W. Va., on October 1, 1910, which position he held at the time of his recent appointment as superintendent of the same division.

John F. Porterfield, who has been appointed general superintendent of the Illinois Central lines south of the Ohio river, with office at New Orleans, La., as has been announced in these columns, was born February 23, 1871, at Pulaski, Ill. He received a public school education, and in May, 1883, began railway work with the Illinois Central, and he has been with that road ever since. Previous to 1890 he was messenger boy, telegraph operator and agent; was then for seven years chief clerk on various divisions, and from 1897 to 1905 was trainmaster on several divisions. He was made superintendent in 1905, and held that title continuously until his present promotion to general superintendent of lines south of the Ohio river on May 10, having had his headquarters at Vicksburg and McComb, Miss., at Memphis, Tenn., and recently at Carbondale, Ill.



J. F. Porterfield.

Cornelius Christie, whose appointment as superintendent of the Hudson division of the New York Central & Hudson River, with office at New York, has been announced in these columns, was

born on September 24, 1864, at Ridgefield Park, N. J., and graduated from the Hackensack public schools. He began railway work in April, 1882, as telegraph operator on the New York, Susquehanna & Western, and from January, 1883, to April, 1888, was telegraph operator on the West Shore. In April, 1888, he was promoted to train despatcher, and in April, 1895, was appointed trainmaster of the New York Central & Hudson River. He was promoted in August, 1902, to superintendent of the River division, and from September, 1908, to November, 1911, was superintendent of

the St. Lawrence division of the same road. On November 1, 1911, he was appointed a special representative of the transportation department, which position he held at the time of his recent appointment as superintendent of the Hudson division, as above noted.

William Tansley, whose appointment as assistant superintendent of the Canadian Pacific, with office at Havelock, Ont., has been announced in these columns, was born on December 27, 1872, at Shelburne, Ont., and was educated in the public schools. He began railway work in September, 1889, with the Canadian Pacific, and for eleven years was operator and agent at various places on that road. He was then for six years train despatcher at Toronto, and from 1906 to 1907 was night chief despatcher at the same place. He was promoted in 1907 to chief train despatcher, and from 1910 to 1911 was instructor of rules. Mr. Tansley was made chief despatcher in 1911, with



C. Christie.

office at Toronto, which position he held at the time of his recent appointment as assistant superintendent of the same company, as above noted.

Traffic Officers.

J. B. Dunlap has been appointed traveling freight agent of the Southern Railway, with office at Cleveland, Ohio.

John A. Harlow has been appointed traveling passenger agent of the Wabash Railroad, with headquarters at Chicago, Ill.

R. E. Davis has been appointed traveling freight agent of the Atlanta, Birmingham & Atlantic, with headquarters at Jacksonville, Fla., succeeding Willis Colloway, commercial agent, resigned to go to another company.

W. E. Blitchington, third assistant traffic manager of the Georgia & Florida, with office at Augusta, Ga., has been appointed traveling passenger agent, with headquarters at Augusta, and his former position has been abolished.

E. J. Dowie, industrial agent of the Lake Shore & Michigan Southern, the Lake Erie & Western and the Pittsburgh & Lake Erie at Cleveland, Ohio, has been appointed general industrial agent of the New York Central Lines west of Buffalo, with office at Chicago.

F. W. Robinson, general freight agent of the Oregon-Washington Railroad & Navigation Company at Portland, Ore., has been appointed assistant to director of traffic of the Harriman Lines, with office at Chicago, succeeding P. C. Stohr, assistant director of traffic, deceased.

A. R. Brown, traveling freight agent of the Chicago, Burlington & Quincy at St. Paul, Minn., has been appointed general agent, with office at Winnipeg, Man., and F. W. Wolterstorff, who also is traveling freight agent, with headquarters at St. Paul, succeeds to the duties of Mr. Brown in charge of the Duluth district.

J. F. Govan, division passenger agent of the Frisco Lines at Houston, Tex., has been appointed district passenger agent, with office at Cincinnati, Ohio, succeeding W. S. Merchant, appointed traveling passenger agent, with headquarters at Cincinnati. H. J. Neff, commercial agent at Corpus Christi, Tex., has been transferred to Houston, and F. P. Dixon, formerly commercial agent at Corpus Christi, has been again appointed to that position, succeeding Mr. Neff.

Engineering and Rolling Stock Officers.

John Purcell, who has been appointed assistant to the vice-president in charge of operation of the Atchison, Topeka & Santa Fe system, with office at Chicago, as has been announced

in these columns, began railway work in 1884 as an apprentice on the Santa Fe, and he has been with that road ever since. He was made gang foreman in 1887, and then filled various positions until he was appointed master mechanic at Argentine, Kan., about 1898 or 1899. He was later transferred as master mechanic to Shopton, Iowa, and in April, 1902, Mr. Purcell was promoted to superintendent of the Topeka shops, which office he held at the time of his recent promotion. In his present position Mr. Purcell will handle all mechanical department matters.



J. Purcell.

E. D. Bronner, superintendent of motive power of the Michigan Central, with office at Detroit, Mich., has been appointed general manager, as noted under Operating Officers.

M. J. Drury, mechanical superintendent of the Northern district of the western lines of the Atchison, Topeka & Santa Fe, at La Junta, Colo., has been appointed superintendent of shops, with office at Topeka, Kan., succeeding John Purcell, promoted.

Clement E. Crowley, resident engineer of the Northern Railway (Costa Rica), with office at San Jose, Costa Rica, has resigned, and his former position has been abolished. The officers of the road and bridge departments will hereafter report direct to the general superintendent.

Louis H. Evans, until May 1 terminal engineer of the Chicago Association of Commerce Committee on Investigation of Smoke Abatement and Electrification of Railway Terminals, has been appointed special chief engineer of the New Orleans Terminal Company, at New Orleans, La., for the reconstruction and completion of the Chalmette slips.

J. E. Buckingham has been appointed superintendent of motor and refrigerator equipment of Wells Fargo & Company with headquarters at New York City. He will have general supervision of the mechanical department with respect to the construction and maintenance of motor and garage equipment, and refrigerator and ventilator cars.

OBITUARY.

E. Doul, commercial agent of the Illinois Central, with office at Cleveland, Ohio, died in Cleveland on May 9.

R. E. Boswell, superintendent of terminals of the Texas & Pacific, with office at Fort Worth, Tex., died at Fort Worth, on May 13.

N. M. Maine, general master mechanic of the Chicago, Milwaukee & Puget Sound, with office at Tacoma, Wash., died at Tacoma, on May 10.

James A. Ritchie, traveling agent of the Chicago & North Western, with office at Cincinnati, Ohio, died at his father's home at Wheaton, Ill., on May 6.

Horace Brown Bannard, engineer maintenance of way of the New York & Long Branch, with office at Long Branch, N. J., died on May 10, at Asbury Park, at the age of 62.

B. F. Hunter, assistant superintendent of the St. Louis & San Francisco, with office at Thayer, Mo., died in a hospital at Jonesboro, Ark., on May 12. He was 52 years old.

Barrett B. Mitchell, assistant to vice-president of the New York Central Lines, with offices at New York and at Detroit, Mich., died on May 14, at Watkins Glen, N. Y. Mr. Mitchell was born on September 24, 1846, at Pittsford, Monroe county, N. Y., and began railway work in June, 1867, as a clerk of the Blue Line at Detroit, Mich. From September, 1867, to January, 1871, he was claim and mileage clerk in the general office of the same line, and then to March, 1878, was chief clerk in the same office. He was appointed general manager of the Blue Line in March, 1878, remaining in that position until January, 1895. From June, 1885, to January, 1895, he was also general manager of the Canadian Southern Line. He was general freight agent of the Michigan Central from January, 1895, to March, 1896, and was general traffic manager from March, 1896, to November, 1905, of the same road. In November, 1905, he was appointed freight traffic manager of the New York Central Lines west of Buffalo, and was later made assistant to vice-president of the New York Central Lines.



B. B. Mitchell.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE ATLANTIC & WESTERN is in the market for 2 locomotives.

THE CHICAGO JUNCTION is in the market for 4 six-wheel switching locomotives.

HOCKING VALLEY is in the market for 5 mikado locomotives and 2 Atlantic type locomotives.

WESTERN OF MINAS, Brazil, is in the market for 9 Pacific type locomotives and 9 mikado locomotives.

THE BRAZIL RAILWAY COMPANY, 25 Broad street, New York, is in the market for 3 mogul locomotives.

THE GRAND RAPIDS & INDIANA has ordered 3 switching locomotives from the Lima Locomotive & Machine Company.

GRACE & COMPANY, New York, are in the market for 4 mogul locomotives for the Arica-La Paz Railway, La Paz, Bolivia.

THE NEW YORK, NEW HAVEN & HARTFORD is closing negotiations with the American Locomotive Company for 15 consolidation locomotives.

THE PERE MARQUETTE, mentioned in the *Railway Age Gazette* of April 26 as being in the market for 40 locomotives, is now in the market for 35 consolidation locomotives, 35 mikado locomotives and 5 Pacific type locomotives.

THE PEKING-KALGAN, CHINA, has ordered six locomotives from the American Locomotive Company. The dimensions of the cylinders will be 20 in. x 26 in. The diameter of the driving wheels will be 50 in., and the total weight in working order will be 160,000 lbs.

CAR BUILDING.

THE BESSEMER & LAKE ERIE is in the market for 1 passenger car.

THE ILLINOIS CENTRAL is in the market for 2,500 50-ton steel gondola cars.

THE CHICAGO & NORTH WESTERN is asking prices on 1,000 steel gondola cars.

THE ATLANTIC & WESTERN is in the market for 3 passenger cars and 3 freight cars.

THE NORFOLK SOUTHERN is said to be in the market for 1,000 freight cars. This item has not been confirmed.

THE PHILADELPHIA & READING is said to be in the market for 2,000 freight cars. This item has not been confirmed.

THE ALABAMA, TENNESSEE & NORTHERN has ordered 250 freight cars from the American Car & Foundry Company.

THE NEWBURGH & SOUTH SHORE is said to be in the market for 125 gondola cars. This item has not been confirmed.

THE GREAT NORTHERN has ordered 1,000 wooden ore cars and 500 automobile cars from the Haskell & Barker Car Company.

THE WABASH, as mentioned in the *Railway Age Gazette* of March 29, has ordered 700 steel frame box cars from the American Car & Foundry Company for June delivery. These cars will have a capacity of 80,000 lbs., and the inside measurements will be 36 ft. 5 $\frac{1}{2}$ in. long, 8 ft. 6 in. wide, and 8 ft. high. Some of the special equipment is as follows:

Axles—American Car & Fdy. Co.
Bolsters—Simplex.
Brakes—Westinghouse.
Brakebeams—Buffalo.
Brasses—Hewitt.

Couplers—Sharon.
Draft gear—Miner friction.
Journal boxes—McCord.
Roofs—Hutchins.
Springs—Railway Steel-Spring Co.

This company has also ordered 500 steel frame box cars from the Haskell & Barker Car Company, for delivery in June and July, which will be of the same capacity and dimensions. The special equipment includes:

Axles—Haskell & Barker.
Bolsters—Simplex.
Brakes—Westinghouse.
Brakebeams—Haskell & Barker.
Brakeshoes—Haskell & Barker.
Brasses—Hewitt.

Couplers—Simplex.
Draft gear—Miner friction.
Journal boxes—Haskell & Barker.
Roofs—Hutchins.
Springs—Railway Steel-Spring Co.

THE ST. LOUIS, BROWNSVILLE & MEXICAN has ordered 2 electric motor cars from the General Electric Company. For a description of these cars see an item under General News.

THE AMERICAN REFRIGERATOR TRANSIT COMPANY, St. Louis, Mo., is said to be in the market for 1,000 refrigerator cars, in addition to the 500 recently ordered from the American Car & Foundry Company. This item has not been confirmed.

THE NORFOLK & WESTERN, mentioned in the *Railway Age Gazette* of April 19 as being in the market for 50 passenger cars, is now in the market for 35 all-steel, 70-ft., coaches, 10 all-steel, 70-ft., postal cars, 8 all-steel, 70-ft., combination baggage and mail cars, 6 all-steel, 70-ft., baggage cars and 5 all-steel 70-ft., combination passenger and baggage cars.

IRON AND STEEL.

THE WABASH is in the market for 20,000 tons of rails.

THE SEABOARD AIR LINE is in the market for 17,000 tons of rails.

THE ATLANTIC COAST LINE is in the market for 20,000 tons of rails.

THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE has ordered 10,000 tons of rails from the Illinois Steel Company.

THE MISSOURI PACIFIC has ordered 6,500 tons of rails from the Illinois Steel Company, and is now in the market for 25,000 tons of rails.

SIGNALING.

New Installations of Block Signals, Interlocking, Telephones for Train Despatching, Etc.

Details of agreements of 12 roads to install block signals in Indiana are given in another column, under State Commissions.

THE ST. LOUIS SOUTHWESTERN is planning to install 132 miles of manual signals between Illmo, Mo., and Jonesboro, Ark., in the near future.

THE CHICAGO & EASTERN ILLINOIS will install automatic block signals on 39 miles of double track between Villa Grove, Ill., and Findlay, and on 63 miles of double track between Bismarck, Ill., and Terre Haute, Ind.

A 65-lever electric interlocking machine, made by the Federal Signal Company, is being put up at Ashtabula, Ohio, at the crossing of the Lake Shore & Michigan Southern, the New York, Chicago & St. Louis, and the Pennsylvania.

THE CHICAGO, MILWAUKEE & PUGET SOUND will install about 125 miles of automatic signals during this year. These will be three-position upper quadrant signals and will protect the single track between Cle Elum, Wash., and St. Regis, Mont.

THE CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA is considering the installation of automatic block signals on the double track between St. Paul, Minn., and North Line, 22 miles; and between Eau Claire, Wis., and Merrillan. The work will probably be undertaken during this year.

THE SOUTHERN PACIFIC has completed plans for the installation of 112 miles of single track automatic block signals between Lathrop, Cal., and Fresno on the Stockton division. The work will be undertaken immediately and the construction will follow the Harriman line standards, using two-position lower quadrant Style "B" signals.

THE NORFOLK & WESTERN will install this year 60.3 miles of three-position upper quadrant automatic block signals between Gillmerton and Suffolk, Notoway and Burkeville, Evergreen and Forest, and Jack and Estes, all in Virginia. Of this 24.5 miles are to be alternating current signaling, and 35.8 miles direct current signaling.

THE ATLANTIC COAST LINE is planning to install 38 miles of automatic block signals between Folkston, Ga., and Moncrief, Fla. The signals will be upper quadrant three-position. An electro-mechanical interlocking plant of 24 levers will be installed at Folkston, Ga., to govern the end of the double track junction and a number of cross-overs and switches at that point.

THE BUFFALO, ROCHESTER & PITTSBURGH is planning to install 35 miles of automatic block signals on its line between Lincoln Park, N. Y., and Gainesville. The signals will be three-position

upper quadrant, and will be arranged for operation under the plan of the General Railway Signal Company's "absolute permissive" block system. Model 2-A signals will be used. Manual signals will be installed on 94 miles of line between Rochester and Ashford, N. Y.

THE CHICAGO, INDIANAPOLIS & LOUISVILLE will install 140 miles of automatic block signals this year between Monon and McDowell and between Peerless and Bedford, Ind. All of the signals will be upper quadrant, 31 miles being two-position and 109 miles three-position. Manual signals will be installed on 97 miles between McDowell, Ind., and New Albany. One interlocking plant is planned. This is to have eight levers, and will be constructed at the Calumet River drawbridge near Hammond, Ind.

THE ATCHISON, TOPEKA & SANTA FE will install automatic block signals on 60 miles of double track between Flagstaff, Ariz., and Ash Fork. The signals will be operated by alternating current, and the block lengths will average two miles. A power plant will be located at Williams, approximately in the center of the stretch to be protected, and power from this point will be used for all station and signal facilities, except at Ash Fork. Additional installations of alternating current signaling are contemplated for the near future.

THE NORTHERN PACIFIC has just awarded to the General Railway Signal Company contracts for the following: 66 miles of double track automatic block signaling extending from Kalama, Wash., to Tenino, on the line between Tacoma, Wash., and Portland, Ore.; nine miles of single track and eight miles of double track between Cheney, Wash., and Spokane; nine miles of single track and 11 miles of double track between Spokane and Houser, Idaho; 28.5 miles of single track between Athol and Sand Point, Idaho; and 15 miles of double track between St. Cloud, Minn., and Rices.

THE NEW YORK, NEW HAVEN & HARTFORD is planning to equip 110 miles of two-track and four miles of four-track road with automatic block signals: between Savin Hill and Atlantic, Mass.; South Framingham and New Bedford, Mass.; East Providence, R. I., and Fall River, Mass.; and Waterbury and Hartford, Conn. The signals will be of the two-position, center-suspended type of semaphore which the New Haven has adopted. All the automatic signals will be operated by alternating current, and will be electric-lighted. A short stretch of manual signals protecting four tracks will also be installed between Worcester and South Worcester. Eight interlocking plants, two mechanical and six electric, are to be built; two at Worcester, one at Neponset, two near New York, one at New Rochelle, one at Hawleyville, Conn., and one at Westerly, R. I. The mechanical plants will have a total of 64 levers operating 81 units, and the electrical plants will have a total of 151 levers operating 307 units. Seven of the plants will control junctions and one will control a yard entrance.

THE CHICAGO & NORTH-WESTERN has awarded to the General Railway Signal Company a contract for 35 miles of double track automatic block signaling to be installed between Madison, Wis., and Baraboo. The extension of the signals from Baraboo to Elroy, to govern 37 miles of double track, is under consideration. The signals are to be three-position upper quadrant, and will be on signal bridges throughout the entire installation. The contract for a 36-lever mechanical interlocking plant to protect the crossing of the North-Western and the Chicago, Milwaukee & St. Paul at Clinton Jct., Ill., was also awarded to the General Railway Signal Company. A contract has also been awarded to the Hall Signal Company for double track automatic signals on the 37 miles between Butler, Wis., and Clyman. The signals are to be three-position upper quadrant semaphores, and will be on signal bridges. The North-Western is planning to install automatic signals on 44 miles, mostly single track, on the line between Harvard, Ill., and Evansville, Wis., via Janesville. Five miles of this line, through the city of Janesville, is double track. The "absolute permissive" scheme of signaling as developed by the General Railway Signal Company will be used on the single track work, with the exception that although the first signal at the out-bound switch leaving a station is at the switch, the first in-coming signal is 800 ft. past the switch on the single track. The signals on the double-track stretch will be mounted on signal bridges. The average length of block will be one mile. The shortest block will be 4,200 ft. and the longest 6,000 ft. Telephones, connected to the despatcher's line, will be installed at each outbound signal at each station.

Supply Trade News.

Ferdinand Schlesinger, of Milwaukee, Wis., and associates have purchased a tract of 415 acres at Hammond, Ind., with the purpose of building a large steel plant.

J. M. Monroe, foreman of locomotive repairs at the Southern Railway shops at Columbia, S. C., has resigned that position and has gone to the Hunt-Spiller Manufacturing Corporation, Boston, as a representative.

The Bucyrus Company, South Milwaukee, Wis., has opened an office in the Brown-Marx building, Birmingham, Ala., under the management of E. L. Byron, who will have charge of the sales in the southern states.

Edward E. Wright has been appointed manager of the central sales district for the McKeen Motor Car Company, Omaha, Neb., and will have charge of the new office which has been established by the company in the Marquette building, Chicago.

J. E. Fries has been made Pacific coast engineer of the Crocker-Wheeler Company, Ampere, N. J., with office at San Francisco, Cal. This company on April 1 opened an office in the Title Insurance building, Los Angeles, Cal.

W. S. Quigley, until recently vice-president and general manager of the Rockwell Furnace Company, New York, has resigned that position to become vice-president of the new Quigley Furnace & Foundry Company, 50 Church street, New York.

Howard K. Porter, a southern representative of the Lorain Steel Company, Philadelphia, Pa., has been made manager of the southern railway department of the U. S. Metal & Manufacturing Company, New York, with office in the Candler building, Atlanta, Ga.

George Price, formerly with the Tidewater Building Company, and later with D. C. Newman Collins and S. Fisher Miller, engineers, has gone to the Flintkote Manufacturing Company and J. A. & W. Bird & Company, both of Boston, as representative, with office at 66 Beaver street, New York.

The stockholders of the Bethlehem Steel Corporation, New York, on May 14, authorized the issue of \$50,000,000 5 per cent. 30-year bonds. These bonds will be secured by a general mortgage on the real estate and manufacturing plants of the subsidiary Bethlehem Steel Company, South Bethlehem, Pa., and stocks representing its investment in mining properties. The present issue will be \$17,500,000 including \$15,200,000 already sold. Proceeds will be used to retire outstanding 6 per cent. notes and \$2,668,000 extension mortgage 5 per cent. bonds, which have already been purchased, and also to provide working capital.

The Southwark Foundry & Machine Company, Philadelphia, Pa., manufacturer of turbine engines, has been sold. The new board of directors consists of Alba B. Johnson, Samuel B. Vauclain, Holstein De Haven Bright, John P. Sykes, Reeves K. Johnson, Alba B. Johnson, Jr., Jacques L. Vauclain and Andrew C. Vauclain. The new officers are as follows: President, Holstein De Haven Bright; vice-president and treasurer, James H. Maloney, and secretary, Alfred C. Maule. Alba B. Johnson, president of the Baldwin Locomotive Works, Philadelphia, Pa., said that this was an individual enterprise and that the Southwark company would have no connection with the Baldwin Locomotive Works.

The various steel companies of the Lake Superior Corporation, Sault Ste Marie, Ont., have been combined into the Algoma Steel Corporation, in accordance with its plans for the consolidation of the various subsidiary companies in natural groups. The companies to be included in the consolidation are the Algoma Steel Company, Sault Ste Marie; the Lake Superior Iron & Steel Company, Montreal, Que.; the Lake Superior Power Company; the Fiborn Limestone Company; the Cannerton Coal & Coke Company, and the Algoma Iron Works, Ltd. The authorized capital of the new corporation will consist of \$30,000,000 stock and \$30,000,000 bonds. An immediate issue of \$13,500,000 bonds has been underwritten, which will provide for the refunding of the short term notes of the various companies included in the new consolidation, as well as the three-year notes of the Lake Superior Corporation now out-

standing. The Lake Superior Corporation will hold all the outstanding stock of the new Algoma Steel Corporation, and will guarantee the bonds. The financing will be done in London, England. The new arrangement will not place additional charges on the Lake Superior Corporation.

TRADE PUBLICATIONS.

LOCK NUTS.—The Boss Nut Company, Chicago, has issued a small booklet describing the uses and principles of the Boss nut, together with price lists.

OIL FILTRATION.—S. F. Bowser & Co., Ft. Wayne, Ind., have published an illustrated booklet entitled Oil Filtration and Circulating Systems. This booklet contains detailed descriptions of these systems amplified by diagrams. Accessories are also illustrated and described. The booklet ends with 17 advantages of these systems.

CHICAGO & NORTH WESTERN-UNION PACIFIC.—The tours department has issued an unusually attractive illustrated folder describing its summer vacation all-expense tours to Colorado, Utah, Lake Tahoe, Yosemite valley, California, Yellowstone park, the Pacific coast, Alaska and the Canadian Rockies, for the summer of 1912, the twelfth season of the tours department.

SOUTHERN PACIFIC.—The passenger department of this company has published an unusually good booklet on Morrow County, Ore. In this booklet the numerous opportunities and resources of this county are described in an attractive manner. Excellent photographs and facts about the soil, the climate and industries combine to give a most favorable impression of this region.

A technical commission has just explored 223 miles between Villa Rica, Brazil, and Port Meyboysi on the right bank of the Parana river with the view to constructing a railway over that route.

Since the railway commissioners of Victoria, Australia, decided to install track locking on the suburban lines, the work has progressed rapidly. At present 58 block sections, covering a total distance of 17 miles of double track, have been completed.

Beira, the port and capital of the territories of the Mozambique Company, Portuguese, East Africa, bears the same relation to Rhodesia that Lourenço Marquez does to the Transvaal, and it has been connected with Salisbury, Bulawayo, and practically all South Africa, including the newly opened Belgian Congo hinterland, by the Beira & Mashonaland Railway, which forms the shortest link between the highlands of Rhodesia and the sea. This railway is owned and operated by British capital, but the Mozambique Company retains an inalienable right to a certain number of votes whether it disposes of its shares or not.

The question of a uniform gage for the Australian state railways was recently discussed at the conference of state premiers in Melbourne. The Victorian representatives urged that while the war conference had decided that there should be a uniform gage of 4 ft. 8½ in., the different governments had not concurred, though it was claimed their officers had done so. Victoria and South Australia were concerned at the procedure adopted by the commonwealth to make a uniform gage of 4 ft. 8½ in. The mileage of the different gages throughout Australia was quoted as follows: 5 ft. 3 in. gage, 4,938 miles; 4 ft. 8½ in. gage, 4,468 miles, and 3 ft. 6 in. gage, 7,627 miles. It was urged that a committee of engineers should be called on to report on the matter, and when the gage was finally settled, the question to be met was that the commonwealth should be expected to pay towards the conversion. The advantages of the wider gage were urged and the following resolution was moved: That a committee of the commonwealth and the states be appointed to investigate the question of the selection of the uniform gage between the capital cities of Australia, more particularly in regard to the necessity for uniform gage; the most favorable gage from the point of view of efficiency and economy of operation, having in mind the conditions likely to be experienced in Australia in the future; the estimated cost of conversion to one of the two wider gages in Victoria, New South Wales and South Australia.

Railway Construction.

New Incorporations, Surveys, Etc.

ALBERTA PACIFIC.—The Canadian parliament has granted a subsidy of from \$3,200 to \$6,400 a mile, to this company, which proposes to build from Cardston, Alta., northwest via Pincher Creek to Lundbreck on the Canadian Pacific's Crow's Nest Pass branch, thence north to Calgary. This project was formerly known as the Pincher, Cardston & Montana. It is said that the charter has been taken over by the Great Northern. Some preliminary work has been carried out near Pincher Creek. C. E. Culbert, secretary, Pincher Creek.

ALBION-MARSHFIELD.—An officer writes that the surveys are not yet finished for a line from Albion, Idaho, north to Marshfield, about 10 miles. A grading contract has been let to local contractors for work on three miles. Five miles of the route will be through a mountainous section. The maximum grades will be 2 per cent., and maximum curvature 10 deg. The plans call for putting up two trestles, also two stations. T. E. Harper, president; W. C. Calvert, chief engineer, Albion.

ARIZONA ROADS.—According to press reports from Phoenix, Ariz., permission has been granted to build a line through the Colorado River Indian Reservation, and surveys are now being made for the line from Parker, Ariz., south to Ehrenberg. P. Pierce, Los Angeles, Cal.; L. H. Chalmers, and F. S. Hildreth, of Phoenix, are interested.

ATLANTIC & NORTHEASTERN.—Under this name a company is to be organized to build from Milltown, Ga., north and northwest via Nashville, Tifton, Ashburn, Doles and Oakfield to Americus, about 100 miles. W. W. Banks, I. W. Myers, Tifton; J. L. Evans, Ashburn; F. C. Hall, Oakdale; and W. M. Cook, Americus, are interested.

ATLANTIC & WESTERN.—An officer writes that this company, which operates a line from Sanford, N. C., east to Broadway, 12 miles, is building an extension east via Mohawk, Fishercreek, Edwardsburg and Dorr to Lillington, in all 25 miles. The work is being carried out by the company's men. W. J. Edwards, chief engineer, Sanford.

BOSTON & MAINE.—See an item under General News regarding the construction of a new 20-mile electric line to the summit of Mt. Washington, N. H.

BOSTON SUBWAYS.—A contract has been given by the Boston (Mass.) Transit Commission for building a section of the subway from the public library to Hereford street, under Boylston street, to the Hugh Nawn Contracting Company, at \$413,135, this company is also building the first section. The next subway section to be started will be in Winter street.

BUTTE, ANACONDA & PACIFIC.—This company, which operates a line from Butte, Mont., west and northwest to Anaconda, about 26 miles, with branches aggregating about 13 miles, has plans made for the electrification of the main line. In addition, the company contemplates the extension of the road from Anaconda northeast to the Georgetown district. H. A. Gallwey, general manager, Butte. (February 3, 1911, p. 257.)

CANADIAN PACIFIC.—A contract has been given to Larkin & Sangster, St. Catharines, Ont., it is said for piercing a 900-ft. tunnel on the line under construction from a point on the existing line 15 miles west of Smith's Falls, Ont., to a connection with the Canadian Pacific at Agincourt. C. W. P. Ramsey, engineer of construction, Eastern Lines, Montreal, Que. (April 5, p. 824.)

CANADIAN ROADS.—The Quebec legislature will grant a subsidy of 2,000 acres of land a mile to any company that will build railway lines from Chaudiere Junction, Que., southwest to Sherbrooke, 120 miles, with branches from Ste. Agathe to Lyster, 10 miles, and from Ste. Agathe to Black lake.

CANADIAN TERMINAL.—This company has obtained an extension of time from the legislature of New Brunswick, for the construction of a line from a point at or near the harbor of L'Etang, to a point on the St. Croix river in York county, N. B. The company was incorporated in New Brunswick, in 1907, when the provisional directors were named as, J. S. Clark, J. D. Chipman,

G. W. Ganong, H. I. Taylor, H. F. White, G. W. Marsh and W. L. E. Marsh, St. George, N. B.

CHICAGO, MILWAUKEE & ST. PAUL.—According to press reports, a contract has been given to the Fleet Construction Company, Dubuque, Iowa, to build the line from Crystal Falls, Mich., west to Iron River, 22 miles. C. F. Loweth, chief engineer, Chicago. (March 15, p. 525.)

CHICAGO, MILWAUKEE & PUGET SOUND.—According to press reports, a contract has been given to a contractor of Seattle, Wash., to build from Plummer, Idaho, northwest to Bell, Wash., on the Oregon-Washington Railroad & Navigation Company, 20 miles. It is said that the contract is worth \$950,000. E. O. Reeder, chief engineer, Wash.

According to press reports, surveys are being made for a section of an extension from Lewistown, Mont., northwest via Great Falls, towards Kalispell.

CHICAGO, ROCK ISLAND & PACIFIC.—An officer writes that the work being carried out in Kansas consists of widening embankments preparatory to ballasting between Pratt, Kan., and Bucklin, 50 miles. A contract for the bank widening has been let to Robert Malone, Lincoln, Nebr. A 6-in. raise of gravel ballast is to be put in by the company's men, after the bank widening work is completed. J. B. Berry chief engineer, Chicago.

COLORADO & SOUTHERN.—According to press reports, this company will replace the present track between Hartville Junction, Wyo., and Orin Junction, 35 miles, with 85-lb. sections. It is understood that Hartville Junction is to be made a division point and that a roundhouse and shops are to be built at that place. H. W. Cowan, chief engineer, Denver, Colo.

DENVER, LARAMIE & NORTHWESTERN.—See an item under Railway Financial News.

FLEMINGTON, HINESVILLE & WESTERN.—An officer writes that a contract has been given to N. T. Hewitt, McIntosh, Ga., to build from McIntosh west via Flemington, Hinesville and Gum Branch to Glennville, between 25 and 30 miles. Grading has been finished on two miles. There will be trestles over Goshen and Horse creeks. The company expects to develop a traffic in naval stores, cotton, lumber and merchandise. J. B. Way, director, Hinesville.

FREDERICTON & GRAND LAKE COAL & RAILWAY COMPANY.—A contract has been given to A. E. Trites, Moncton, N. B., to build from Gibson, N. B., east to Minto, where a connection is to be made with the New Brunswick Coal & Railway Company's line, 31 miles. A number of bridges are to be built on the line. D. F. Maxwell, chief engineer, Fredericton, N. B. (March 22, p. 701.)

GATINEAU & UNGAVA.—See Ottawa & Ungava.

GRAND LAKE & BELLE RIVER.—Application has been made for a charter to build a 45 mile line through the Grand Lake Victoria district in the province of Quebec from a point on the National Transcontinental (Grand Trunk Pacific). The proposed line has been subsidized by both the federal and provincial governments, but will not be built until the National Transcontinental is completed. The line is to be built to open up timber lands. J. B. Fraser, 74 Nepean street, Ottawa, Ont., may be addressed.

GRAND TRUNK.—A sub-committee of the Massachusetts legislative Committee on Railroads reported to the full committee today a bill permitting the Southern New England Railroad of the Grand Trunk to extend its lines to Boston. The terms of the bill, as reported, have been approved by counsel of the Southern New England.

HUDSON BAY RAILWAY.—Plans have been made for building the second section of 120 miles, and bids will be called for at once. J. D. McArthur, Winnipeg, Man., has the contract for the first section of 185 miles from LePas, Keewatin, northeast. John Armstrong, chief engineer, Winnipeg. (March 8, p. 453.)

INTERCOLONIAL.—Subcontracts for building the line between Dartmouth, N. S., and Deans Settlement have been let, as follows: To D. Washburn, Dartmouth, from mileage 1 to 12; to G. S. Whitehead Construction Company, Lawrencetown, from mileage

12 to 27; to W. Waddell, Musquodoboit Harbor, from mileage 34 to 36; to Garrett & Campbell, Musquodoboit Harbor, from mileage 36 to 45; to McDonald & Mackintosh, Little River, from mileage 45 to 55; to Chisholm & McGillivray, Middle Musquodoboit, from mileage 55 to 62; to Billman, Gillis & Company, Deans Settlement, from mileage 62 to 68. Cavicchi & Pagano, Plaster Rock, N. B., are the general contractors. (March 22, p. 701.)

KANSAS CITY & MEMPHIS.—An officer writes that track laying is now under way from Clear Creek, Ark., east to Fayetteville. This is the last section of five miles to complete the line from Cave Springs south to Fayetteville, 20 miles. M. Hays, chief engineer, Rogers. (May 10, p. 1078.)

MIRAMICHI VALLEY.—Incorporated in New Brunswick to build from Newcastle, N. B., on the Intercolonial, following the valley of the Miramichi river to Tracadie. Steamship and express services may also be operated in connection with the railway. Construction must be commenced within one year, and completed within five years. The capital stock is \$1,000,000, and bonds may be issued to the extent of \$35,000 a mile. The provisional directors are J. Robinson, E. A. McCurdy, D. Morrison, W. L. Allain, W. A. Park, Hon. A. Ritchie and E. H. Sinclair, Newcastle, N. B.

NEREPIS & LONG ISLAND.—Incorporated in New Brunswick to build from a point on the Canadian Pacific at or near Welsford, N. B., to a point between Gagetown and Hampstead, Queens county, with a branch from a point in Petersville parish to a point in the Clones district, the work to be started within two years, and completed within four years. The capital stock is \$98,000, and the aggregate amount of debentures must not exceed \$25,000 a mile, including any amount guaranteed by the provincial government. The provisional directors are H. W. Woods, J. M. Queen, J. B. M. Baxter, F. C. Taylor and A. R. Slipp, Welsford, N. B.

NEW YORK, NEW HAVEN & HARTFORD.—According to press reports, this company, which controls the Poughkeepsie bridge system, and the Central New England, is planning to carry out improvements on these lines to include double-tracking the line west of the Hudson river from Poughkeepsie, N. Y., to Campbell Hall, 30 miles, and on the line between Stevenson, Conn., and Shelton, 7½ miles. Edward Gagel, chief engineer, New Haven, Conn.

NEW YORK SUBWAYS.—The New York Public Service Commission, Second district, has given a contract for the construction of section No. 14 of the Lexington avenue subway to Arthur McMullen, New York, who was the lowest bidder at \$3,889,775. Section No. 14 constitutes the tube under the Harlem from 129th street, in the borough of Manhattan, to 135th street, in the borough of the Bronx, and is 3,176 ft. long. McMullen's accepted bid was for type "K," which is four steel tubes in one mass of concrete.

NORTH SHORE RAILWAY & NAVIGATION COMPANY.—Incorporated in New Brunswick, to build from a point on the Intercolonial, at or near Adamsville, N. B., to a point at or near Snowshoe lake, to connect with the National Transcontinental at convenient points; from Beersville via Rexton, to a point at or near Richibucto Head on the Gulf of St. Lawrence, and to operate a car and passenger ferry from Richibucto Head to connect with Prince Edward Island, at or near Cape Wolfe or West Point, P. E. I. The capital stock is \$1,000,000, and bonds may be issued to the extent of \$35,000 a mile, which may be guaranteed by the province. The provisional directors are G. W. Fowler, Sussex, N. B.; M. F. Keith, Moncton; H. J. Von Hagen and E. E. Smith, New York; W. A. P. Davis and J. H. Wood, Philadelphia, Pa.

OTTAWA & UNGAVA.—The Canadian parliament has extended the time for building from the National Transcontinental (Grand Trunk Pacific) at the head of the Gatineau river, Que., northeasterly to Lake Chibougamou, about 140 miles, thence to the east side of Lake Mistassim, 60 miles, and to the northern boundary of Quebec at Homani, or Summit Lake, in all about 450 miles. The line is to be continued via the source of the Big river to Lake Kaniapiskau northwest to Lake Minto, or Leaf river, or north to the Koksoak river, and from either of these places northeast to Leaf lake, or Ungava bay, a total of about 900 miles, and is eventually to be extended from Lake Minto to Payne lake, 200 miles. This project was formerly

known as the Gatineau & Ungava. A. T. Genest, civil engineer, Ottawa, Ont., is interested.

PINCHER, CARDSTON & MONTANA.—See Alberta Pacific.

ST. CROIX DOCKS & RAILWAY.—Incorporated in New Brunswick to build from a point in or near St. Stephen, N. B., to a point on the shore of Oak bay, or to a point on the St. Croix river in Charlotte county, also dock accommodation at the latter points. The capital stock is \$499,000, and bonds may be issued not exceeding \$40,000 a mile of line built. The provisional directors are G. D. Grimmer, D. F. Maxwell, W. H. Berry, F. P. McColl, F. M. Murchie and G. J. Clarke, St. Stephen, N. B.

ST. LOUIS & SAN FRANCISCO.—See item under General News regarding improvements to be carried out by this company.

SHARPSVILLE & WESTERN.—Incorporation has been asked for in Pennsylvania by this company with a capital of \$15,000, to build from Sharpsville, Pa., south to North Sharon. The incorporators include F. K. Smith, Sharon; C. D. Dyer, Pittsburgh; F. W. Tickner, Sharpsville; and D. B. Thompson, Cleveland, Ohio.

SOUTHERN ILLINOIS RAILWAY & POWER COMPANY.—Incorporated in Illinois, with offices in Chicago, to build from Eldorado, Ill., west and southwest, via Raleigh and Harrisburg to Carriers Mills, Saline county, about 20 miles. The directors include William Rockmann, T. G. Deering, W. M. Klein, S. Kraus and R. G. Crandall. The incorporators are L. D. Hewitt, E. H. Bach and R. A. Phillips.

SOUTHERN NEW ENGLAND.—See Grand Trunk.

SUGARLAND.—This company, which operates a line from Sugarland, Tex., to Arcola, 14 miles, has asked for authority to issue \$752,189 of bonds, to provide funds for an extension northwest to Hempstead, 57 miles. The extension is to be also bonded as the construction progresses. W. T. Eldridge, president and general manager, Sugarland.

SUSSEX, STUDHOLM & HAVELOCK.—Incorporated in New Brunswick to build from Havelock, N. B., to a point on or near the Intercolonial at Sussex. The capital stock is \$39,000, and bonds may be issued to the extent of \$35,000 a mile. The line must be built and ready for traffic within seven years. The provisional directors are S. A. McLeod, G. B. Jones, J. E. McAuley, Havelock, N. B.

TEMISKAMING & NORTHERN ONTARIO.—The South Porcupine branch has been extended from South Porcupine, Ont., to Timmins, eight miles. S. B. Clement, chief engineer and superintendent of maintenance, North Bay.

UNION PACIFIC.—According to press reports, this company will begin work soon on a branch from Gering, Neb., west towards Medicine Bow, Carbon county, Wyo. It is expected that the line will be in operation before next winter between Gering and Bordeaux, Wyo., 70 miles. R. L. Huntley, chief engineer, Omaha, Neb.

RAILWAY STRUCTURES.

ALBANY, N. Y.—The New York Public Service Commission, Second district, has received petitions asking for the elimination of grade crossings as follows: In Friendship, Allegany county, over the Pittsburg, Shawmut & Northern; at Veteran, Chemung county, over the Pennsylvania Railroad; at Erwin, Steuben county, over the Erie; at Potsdam, St. Lawrence county, over the New York Central & Hudson River; at Black River, Jefferson county, over the New York Central & Hudson River; at Nunda, Livingston county, over the Pennsylvania Railroad; and at Lewiston, Niagara county, over the R. W. & O. division of the New York Central & Hudson River.

ARMSTRONG, ONT.—See Moncton, N. B.

BARTON, N. Y.—The New York Public Service Commission, Second district, has ordered the elimination of the highway crossing the tracks of the Erie and the Lehigh Valley railways in Barton, Tioga county. A steel bridge with approaches is to be built over the tracks at another point.

CALVERT, ONT.—See Moncton, N. B.

COCHRANE, ONT.—See Moncton, N. B.

DETROIT, MICH.—Bids are being received by the Michigan Central for terminal improvements at Detroit. The work includes the enlargement of the principal freight yard, laying about 20 miles of yard and commercial tracks, and putting up a new engine house and shop buildings. Some of the work will be carried out by the company's men. The cost of the improvements will be about \$1,000,000.

EDMONTON, ALBERTA.—The Canadian Pacific has let a contract for a new fireproof office building, to C. W. Sharpe & Son of Winnipeg. The building will be of steel, fireproof construction, and will cost about \$300,000. W. W. Blair, of Winnipeg, is the architect.

EDMUNDSTON, N. B.—See Moncton, N. B.

GULFPORT, MISS.—According to press reports, the Gulf & Ship Island will make improvements at Gulfport to provide additional ship terminal facilities. It is understood that a new pier will be put up at a cost of \$500,000, and that the present docks and coal tipple will be rebuilt at a cost of \$200,000.

GRANT, ONT.—See Moncton, N. B.

HARTVILLE JUNCTION, Wyo.—See Colorado & Southern under Railway Construction.

LAUREL, MISS.—The New Orleans, Mobile & Chicago has let the contract for a new two-story brick office building and warehouse, 100 x 250 ft. Work is to be started soon on a new passenger station at Laurel for the New Orleans & Northeastern.

MONCTON, N. B.—Bids are being received by the commissioners of the National Transcontinental for the construction of a number of 200-ton mechanical coaling plants, with sand houses and track approaches at the following places: Moncton, N. B.; Edmundston, Grant, Ont.; Calvert and Armstrong, and for putting up a 1,000-ton coaling station with inclined trestle approach at Cochrane.

NEWPORT NEWS, VA.—According to press reports, the Chesapeake & Ohio will soon begin work on a new coal pier at Newport News, to be 1,200 ft. long and 88 ft. high.

PIEDMONT, W. VA.—The Baltimore & Ohio has given a contract to the Roydhouse-Arey Company, Philadelphia, Pa., for remodeling the passenger station at Piedmont, at a cost of about \$7,000.

PORTLAND, ORE.—The Spokane, Portland & Seattle, and the allied Hill lines in Oregon has announced they will ask the city council for franchises for several new lines on the east side of the city, to be used in connection with a large new eight-story concrete-steel freight warehouse and other improvements to cost about \$2,000,000.

SAVANNA, ILL.—The Chicago, Milwaukee & St. Paul will build a new station at this point in addition to a new yard, and improvements to the present yard facilities.

TUCSON, ARIZ.—The El Paso & Southwestern has asked for bids on a station, freight house and engine house, to be submitted by June 20.

Starting 32 miles from Lourenço Marquez, Portuguese East Africa, on the main line to Johannesburg, Transvaal, a branch, running northeast for 50 miles, is to be laid to the settlement of Xinavane, and also to Magude on the Incomati river. The Incomati Estates, Ltd., a sugar concern that is beginning operations on a large scale, has secured the contract for this line. A request has been made for tenders for the extension of this branch 125 miles in the same general northeasterly direction to Manjacase, where it is to connect with the railway at present under construction from the port of Chai-Chai on the Limpopo river, which enters the Indian ocean about 90 miles up the coast from Lourenço Marquez. This latter road, starting from Chai-Chai, is the Gaza railway, and 20 of the 33 miles to Manjacase are already completed and in operation. It is a narrow-gage road intended to open a fertile region hitherto inaccessible to commerce. Its usefulness is seriously handicapped by the dangerous shoal bar in the Limpopo river that makes Chai-Chai a most difficult port to enter. The materials for this railway, as well as the rolling stock, were furnished by a German firm that secured the contract through public tender. From it three branches are planned.

Railway Financial News.

ALBERTA RAILWAY & IRRIGATION.—The stockholders of this company which is leased to the Canadian Pacific, the latter owning nearly all of the capital stock, will vote on May 27 on issuing bonds, the respective amounts, the rate of interest, and also on authorizing the form of the mortgage, if any, to be given to secure the payment of the bonds.

BALTIMORE & OHIO.—This company has called for payment on June 1 \$73,000 first mortgage 5 per cent. coal bonds of the Monongahela River at par and interest at the Maryland Trust Company, Baltimore, Md.

BIRMINGHAM & SOUTHEASTERN.—This company has acquired the Tallasse & Montgomery extending from Tallasse, Ala., to Milstead, 6 miles, on the main line of the Atlanta & West Point. The Birmingham & Southeastern runs from Union Springs to Tallasse, about 35 miles.

BOSTON & ALBANY.—The Massachusetts railway commission on May 10 granted the application to issue \$1,000,000 25-year 4½ per cent. bonds dated July 1, 1912. Proceeds will be used for the following additions and improvements made and to be made, estimated cost \$1,025,500: Third tracking, \$55,000; passing tracks and sidings, \$65,000; yard improvements at Worcester, \$250,000; new buildings at West Springfield, Pittsfield and Worcester, \$145,000; lengthening platforms, \$56,000; rebuilding or repairing bridges, \$350,000; signals and interlockings, \$22,000, and miscellaneous, \$82,500.

BOSTON & MAINE.—This company will soon sell \$12,000,000 one year 4 per cent. notes to New York bankers. Part of the proceeds will be used to retire between \$6,000,000 and \$7,000,000 floating debt maturing before July 1. See another item regarding this company under General News.

CHICAGO, GREAT WESTERN.—Edwin N. Hurley has been made a director, succeeding W. G. Lerch.

CHICAGO & WESTERN INDIANA.—This company has called for payment on June 1 at 105 and interest \$105,000 6 per cent. general mortgage bonds of December 1, 1882-1932, at the office of J. P. Morgan & Company, New York.

CENTRAL OF GEORGIA.—The shareholders will vote on June 3 on a proposition to issue \$15,000,000 preferred stock for refunding some obligations of the company, particularly the 3 issues of income bonds, most of which have been acquired by the Illinois Central. First Vice-President Col. A. R. Lawton in his statement said in part: "Less than \$500,000 of the total \$15,000,000 income bonds are outstanding in the hands of the public. The new preferred stock will be offered to the stockholders for subscription in cash at par. When this refunding is accomplished, the capitalization will be in round numbers two-thirds bonds and one-third stock. This will greatly improve the financial condition of the company, and will enable it to sell such refunding bonds as may be issued hereafter for additions, betterments, extensions, etc."

CHICAGO & WEST MICHIGAN.—See Pere Marquette.

CRIPPLE CREEK CENTRAL.—A quarterly dividend of 1 per cent. has been declared on the \$2,500,000 common stock for the quarter ended March 31, payable June 1. This is the first dividend that has been declared on the common stock since October, 1907, when 1½ per cent. was paid.

DELAWARE & HUDSON.—W. H. Williams, third vice-president, has been elected a director to succeed John Jacob Astor, deceased.

DENVER, LARAMIE & NORTHWESTERN.—The Denver Republican of May 9 gives the following item:

"As a result of the numerous conferences last week by committees representing the stockholders of the Denver, Laramie & Northwestern and its allied concerns—the Northwestern Land & Iron Company, the Denver-Laramie Realty Company and the Colorado-Wyoming Realty Company—it is announced that a definite plan has been agreed upon to put the affairs of these companies in good shape and provide for additional funds for the extension of the railway from Greeley, Col., to Severance.

"The reorganization is to be accomplished by levying an assessment of 15 per cent. on the preferred stock of each company, which it is expected will place all the concerns on a sound financial basis. Two-thirds of the proceeds of the assessment will be set aside for the use of the railway, the company to secure the same by its note, bearing interest at 6 per cent., which will fall due in six months. The sum thus raised will approximate \$400,000.

"Of this amount \$125,000 will be used by the railway company to pay off pressing indebtedness and \$100,000 will be devoted to the construction of the extension. The railway in return will deposit with a trustee \$450,000 in bonds to insure the stockholders the return of the \$225,000 advanced, giving those who are assessed a security of two for one in bonds for two-thirds of their assessment.

"In a statement issued by the reorganization committee, it is shown that the control of the railway goes to the Northwestern Land & Iron Company, whose president, John D. Milliken, has resigned. S. J. Kent, director in the land company and president of the Denver-Laramie Realty Company, has also resigned from both positions and his and Milliken's places will be filled at an early date.

"W. E. Green, general manager of the railway, who in all probability will be named at the annual meeting as president to succeed C. S. Johnson, resigned, has issued a statement in which he declares that upon the completion of the Severance extension of the road, the company's net earnings from July 1 to June 30, 1913, will total \$120,000. The interest on outstanding bonds and floating debt will amount to \$64,100, leaving a net surplus of \$55,000 according to his estimate. He declares that this showing will insure the sale of bonds for future construction and will enable the road to take care of itself without outside aid."

DETROIT, TOLEDO & IRENTON.—Benjamin S. Warren, George K. Lowell, and Thomas D. Rhodes have resigned as receivers, and the three bondholders' committees have agreed to unite in recommending the appointment of George P. Johnson, formerly general superintendent of the Norfolk & Western, as sole receiver. As soon as the appointment is made, suit will be filed in the United States district court for the eastern district of Michigan, southern division to foreclose the Detroit Southern, Ohio Southern division, first 4 per cent. mortgage of 1901.

FRANKFORT & CINCINNATI.—Charles E. Hoge, president of the State National Bank of Kentucky, will on July 1 take over this road, which is now operated by the Louisville & Nashville. The purchase of the control by the Louisville & Nashville was held illegal by the Kentucky court of appeals in June, 1911. A number of local capitalists will be associated with Mr. Hoge in the operation of the road.

NEW YORK CENTRAL & HUDSON RIVER.—See item under Traffic News.

NEW YORK, NEW HAVEN & HARTFORD.—See item under General News; also an item under Traffic News.

PENNSYLVANIA.—It is rumored that this company is seeking to acquire the minority stockholdings of the Pittsburgh, Cincinnati, Chicago & St. Louis, and that it will offer its stock for the stock of that company, share for share. The P. C. C. & St. L. pays 5 per cent. on both its common and preferred stocks while the Pennsylvania pays 6 per cent. on its common stock. Regarding this transaction the *Wall Street Journal* says: Such an exchange as share for share of its own stock would cost the Pennsylvania surprisingly little in added immediate disbursement. Pennsylvania owned on January 1 last \$22,462,200 of Pittsburgh, Cincinnati, Chicago & St. Louis' \$27,475,900 preferred stock and \$23,390,300 out of the \$37,173,100 common stock, or a total of \$45,852,500 owned out of \$64,649,000 outstanding. The minority is a little less than 188,000 shares, on which the difference between 5 per cent. and 6 per cent. would be \$188,000 a year.

George D. Dixon, vice-president in charge of traffic, has been made a director, succeeding John B. Thayer, deceased.

PERE MARQUETTE.—The receivers have made application to the Michigan court for permission to pay out of earnings the interest on the first mortgage bonds of its subsidiary, the Chicago & West Michigan, due June 1. This interest is \$143,950.

QUEBEC ORIENTAL.—The special meeting of the holders of the first mortgage 5 per cent. Matapedia section bonds held in London April 16 to authorize the issue of \$250,000 prior lien bonds or other securities for repairs and renewals to the Matapedia section, was adjourned to May 14 on account of a quorum not being present.

RUTLAND.—See item Traffic News.

ST. LOUIS & SAN FRANCISCO.—William Salomon & Company, New York, will receive the 3-year 5 per cent. notes, dated March 1, 1910 (which have been called for payment at par and interest on June 1, 1912) up to June 1, 1912, less discount for unexpired term at 3 per cent. a year, in exchange for the New Orleans, Texas & Mexico division first mortgage 5 per cent. bonds at 95 and interest.

ST. LOUIS & SAN FRANCISCO.—See item under General News.

SUGARLAND.—See item under Railway Construction News.

VIRGINIAN.—The \$25,000,000 first mortgage 5 per cent. bonds, recently issued, are being offered at 99 by Kissel, Kinnicutt & Co., and National City Bank of New York, and Lee, Higginson & Co., Boston. The \$50,000,000 of these bonds, authorized but not issued, may be issued for the following purposes:

1. For extension of main line; issue of bonds is not to exceed actual cost of construction and is limited to \$75,000 per mile.
2. For additional branch line mileage; bonds not to exceed \$50,000 per mile.
3. For second main track; not in excess of \$50,000 per mile.
4. For additions and improvements of the Virginian Terminal Railway; bonds issued not to exceed actual cost of construction.
5. For additional equipment and all other additions and improvements to properties; bonds issued to be not in excess of 75 per cent. of actual cost.
6. For acquisition of stocks, bonds or other obligations of any other companies whose properties form in effect extensions of the Virginian Railway's system, or which can be operated advantageously in connection therewith:
 - (a) At least 60 per cent. of stock in each case must be acquired.
 - (b) Bonds issued not to exceed 75 per cent. of actual cost of acquisitions.
 - (c) Bonds of this issue must be reserved equal to any prior liens or obligations of such controlled companies.
 - (d) Aggregate amount of outstanding securities upon such controlled properties, including these bonds and all obligations equal or prior to these bonds, not to exceed \$75,000 per mile of main line owned by controlled company.
 - (e) An amount not exceeding \$10,000,000 of these bonds may be issued to acquire stocks of other corporations.

The importance of the two principal railways of Mozambique, Portuguese East Africa, is out of all proportion to their mileage. The main line from Lourenço Marquez to the Transvaal border is only 55 miles long, but it does an enormous traffic, both freight and passenger for this port is not only the gateway to the Transvaal but is also the source from which the mines draw annually 60,000 natives. It should be noted that an equal number of natives return each year and that they pay full fare. Branching off from this main road is the Swaziland line, 35 miles long. It connects Lourenço Marquez with Mailana and is being extended to the Swaziland border. Its completion will effect a saving not only in cartage costs but also in railway mileage. The Swaziland railway was started with the idea of opening a shorter route from Lourenço Marquez to Johannesburg, and the Portuguese portion was finished years ago, but a hitch occurred on the British section. As a result, Johannesburg, with its annual importation of approximately \$30,000,000 worth of goods via Lourenço Marquez, is nine hours farther by rail from that port than it need be. The yearly waste is tremendous, but it is offset in a measure by the advantage that accrues to another section of the South African Union, which sees in the completion of the Swaziland railway the decline of Durban's career as a port of entry for the Rand. Durban has for years been the rival of Lourenço Marquez, and has tried to do artificially for its harbor what nature has done for the latter; eventually the Rand must cease paying this extra freight on its machinery and supplies, and then the Swaziland railway will be an economic factory big enough to change the channel of trade.